Environmental Assessment

For

Hochatown Wildland Urban Interface Vegetation Management Project

Responsible Agency:
U.S. Forest Service
Ouachita National Forest
Oklahoma Ranger Districts

Responsible Official:
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This project is subject to subparts A and B of *36 CFR Part 218 Project-Level Pre-decisional Administrative Review Process* (objection process); it is not authorized under the Healthy Forest Restoration Act (HFRA).

October 2019

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Chapter 1
Purpose and Need for the Proposed Action

Proposed Action

The Oklahoma Ranger Districts propose to implement the following management activities*:

- Seedtree regeneration harvest – 481 acres
- Commercial thinning harvest – 4,564 acres
- Group Selection harvest – 664 acres
- Clearcut regeneration harvest – 56 acres
- Timber Harvest Connected Actions
    - Timber stand improvement - release – 1,201 acres
    - Mechanical site preparation – 37 acres
    - Chemical site preparation – 1,163 acres
    - Hand planting of shortleaf pine – 56 acres
    - Timber stand improvement – Pre-commercial Thinning (if needed)
- Wildlife Stand Improvement - Midstory removal; mechanical & chemical– 4,564 acres
- Wildlife pond construction – 14 ponds
- Bluebird nest box construction – 28 boxes
- Mechanical removal of vegetation along roads – 196 acres
- Erosion control/Pollinator habitat improvement seeding – 196 acres
- Fire line construction; Mechanical or hand – 19.35 miles
- New system road construction and relocation – 5.02 miles
- Temporary road construction – 10 miles[1]

*All figures are approximate and are for total acres in a stand. Treatment acres would be less due to avoided slopes and/or streamside management areas.

The Hochatown WUI (Wildland-Urban Interface) Project Area is located due east of the town of Hochatown, Oklahoma and due west of Broken Bow Lake. The project is located within Sections 3-9, and 15-18 of Township 5 South, Range 25 East and Sections 10-15, 22-27, and 36 of Township 4 South, Range 24 East, McCurtain County. The project area is composed of approximately 6,260 acres of National Forest System land within the Oklahoma Ranger Districts of the Ouachita National Forest. The proposed action would occur in Management Area (MA) 16.

[1] The Proposed Action detailed in the January 19, 2018 Project Announcement (scoping) letter has incrementally changed in both proposed quantities and treatments. For example, the proposal to amend existing authorizations to allow chemical application on utility ROW was removed from the Proposed Action as it was determined to be not ripe for decision; seedtree regeneration harvest acres decreased; commercial thinning harvest acres increased.

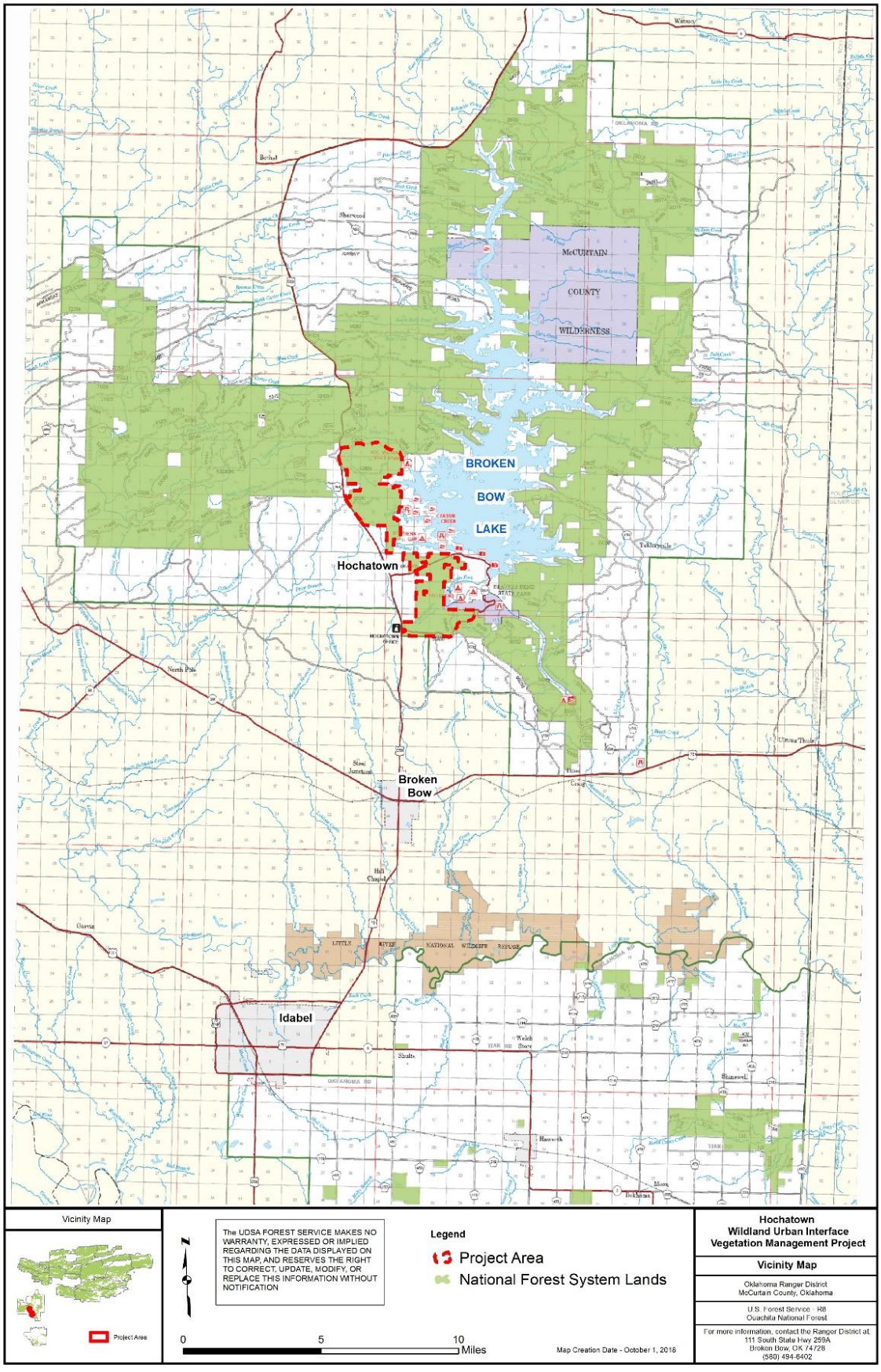

FIGURE 1. VICINITY MAP

Ouachita National Forest
Arkansas and Oklahoma

Purpose of the Action

Overall guidance for this action is found in the 2005 Revised Land and Resource Management Plan for the Ouachita National Forest (Revised Forest Plan). The primary goal of the Revised Forest Plan is to promote diverse, healthy, productive, and sustainable ecosystems. The purpose of this action is to promote the health and vigor of the project area by providing for a diversity of plant and animal communities, creating early seral habitat, reducing fuel accumulation, and producing a sustainable yield of wood products.

Guidance is also found in the National Cohesive Wildfire Strategy Goals/Objectives (USDA & USDOI). These goals/objectives are to Restore and Maintain Resilient Landscapes- Prescribed Fire: Expand or maintain in areas of current use, Non-fire Treatments: Supported by forest products industry, Non-fire Fuels Treatment: In areas with limited economic markets, Fuels Treatments as a precursor to prescribed fire or managed wildfire. Create and Maintain Fire-adapted Communities-Focus on home defensive actions, Focus on combination of home and community actions, Reduce catastrophic natural ignitions, Reduce accidental human-caused ignitions, Reduce human-caused incendiary ignitions (e.g., arson). Improve Wildfire Response- Prepare for large, long-duration wildfires, Protect structures and target landscape fuels, Protect structures and target prevention of ignitions.

Need for the Action

- Past fire suppression activities have removed the natural role of fire from the landscape, resulting in excessive fuel accumulations. This increases the intensity and severity of how wildfire affects the natural resources and conversely the risk of damage to resources in the event of wildfire is increased.
- Public and Responder safety are at risk should a wildfire occur. The rapid development and expansion of the Hochatown community into the wildlands poses an immediate threat to the health and welfare of residences, tourist and responders.
- Pine and hardwood stands contain damaged, poorly formed and diseased trees. The trees are overcrowded or densely stocked, reducing growth and crown development. These conditions result in stress and reduced vigor and health, increasing susceptibility to insects and disease.
- There is limited access to those stands in need of silvicultural treatment, resulting in the need for temporary road construction. Some existing roads are not useable and create the need for road reconstruction.
- There is a lack of high quality forage and a lack of nesting habitat for species requiring early successional habitat.
- A booming population and tourism industry has also increased the number of recreating public on and around Forest Service lands, increasing the need for established firelines and defensible space along the Forest Service/Private land boundary to protect public safety.

Existing Versus Desired Conditions

Contrasts between existing and desired conditions, as well as management activities designed to meet project objectives, are shown in Table 1.1. These management activities were determined to be within the scope of this analysis. Project activities would move the existing conditions toward the desired conditions as referenced in the Revised Forest Plan. Within the Proposed Management Activities column, the acres outlined for specific treatments are often given in total acres within a stand. **Sensitive areas such as riparian or steep slopes would be avoided, resulting in fewer actual acres disturbed.**

EXISTING CONDITIONS CONTRASTED TO DESIRED CONDITIONS (TABLE 1.1)

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
To remove offsite species (Revised Forest Plan, pp. 60, OBJ 11; pp.82 FR010)	There are existing stands of offsite loblolly pine within the project area.	There are 471 acres of offsite loblolly pine plantations.	Commercial clearcut 56 acres and plant to native shortleaf pine for accelerated ecosystem restoration.
Improve forest health by maintaining conditions that would reduce insect and disease caused losses (Revised Forest Plan, pp. 58-60, OBJ 10)	Trees in many stands are crowded or densely stocked; many forest stands are older than 50 years of age. These conditions result in stress and reduced vigor and health, increasing susceptibility to forest insects and disease.	4,680 acres within the project are older than 70 years. 5,595 acres within the project area have basal areas in excess of 75 sqft/ac.	5,765 acres of commercial timber harvests consisting of even aged, uneven aged, and intermediate treatment regimes
Provide grass-forb or shrub-seedling habitats (include regeneration areas 0-10 years in age, areas of recent heavy storm or insect damage, and woodland conditions at a rate of: a minimum of 6 percent of the suitable acres in MA 16; Limit even-age regeneration cutting to no more than 14 percent (Revised Forest Plan, p. 78)	There is currently 13 acres or 0% in early seral (0-10 years in age) of 6,218 suitable acres.	Provide at least 373 acres of grass-forb or shrub seedling habitat from suitable acres. Limit even-aged regeneration harvests to 870 acres.	537 acres of even aged regeneration harvest (56 acres clearcut, 481 acres seedtree)
Improve forest health by maintaining conditions that would reduce insect and disease caused losses in hardwood dominated stands (Revised Forest Plan, pp. 58-60, OBJ 09)	Hardwood stands within the project area are older and becoming more susceptible to forest insect and disease issues.	631 acres of hardwood forest types within the project area, only 37% under 70 years old.	449 acres of overstory thinning in hardwood forest type stands to increase residual tree health and vigor.
Contribute to the economic	Timber stands are	Acreage within project	5,765 acres Commercial timber

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
base of local communities by providing a sustained yield of high-quality wood products at a level consistent with sound economic principles, local market demands, and desired ecological conditions (Revised Forest Plan pp. 68)	currently located within the MA 16 with areas "Suitable for Timber Harvest".	eligible for timber harvests depends upon terrain and scenic/visual limitations.	harvests consisting of even aged, uneven aged, and intermediate treatment regimes
Vegetation Condition Class (VCC) Stands treated by reducing the number of overstory trees per acre (to approximately 50 to 70 square feet basal area) and removing woody midstory and understory vegetation. A "park-like" or "woodland" condition is the goal (Revised Forest Plan pp. 25) Desired Condition within the WUI **(USDA & USDOI, 2004)**	Present VCC fire exclusion is representative with Overstory, midstory and understory Trees crowded or densely stocked providing means for sustained crown fire. Shading of >50% has reduced amount of available browse (grass & forbs).	Vegetation Condition Class 1B 357ac 2B 27ac 3A 2,931ac 3B 2,095ac NON BURNABLE URBAN 230ac BURNABLE URBAN 110ac BURNABLE AGRICULTURE 2ac	5,765 acres overstory-Commercial timber harvests, 4,564 acres midstory-Mechanical thinning/fuel reduction,
Vegetation Departure (VD) In WUI areas, vegetation management to restore, maintain, or enhance fire adapted ecosystems to an approximate "reference condition" will be vigorously undertaken (Revised Forest Plan pp. 25) Desired Condition within the WUI **(USDA & USDOI, 2004)**	There are existing stands of offsite loblolly pine within the project area. Trees in many stands are crowded or densely stocked. These conditions result in stress and reduced vigor and health, increasing susceptibility to forest insects, disease and catastrophic wildfire.	VD Departure Severity 1B LOW-MODERATE 357ac 2A MODERATE-LOW 27ac 2B MODERATE-HIGH 563ac 3A HIGH-MODERATE 2,917ac 3B HIGH 2,100ac NON BURNABLE URBAN 230ac BURNABLE URBAN 110ac BURNABLE AGRICULTURE 2ac	56 acres – Commercial clearcut and plant to native shortleaf pine for accelerated ecosystem restoration. 5,765 acres - Commercial timber harvests consisting of even aged, uneven aged, and intermediate treatment regimens with associated reforestation. 302 acres - Mechanical thinning/fuel reduction.
Where there is no existing water source, provide at least one wildlife pond per 160 acres. (Revised Forest Plan, WF010 p. 79)	There is one wildlife pond within the project area.	Provide at least 49 total wildlife ponds to accomplish wildlife objectives	14 ponds - Wildlife Pond Construction

Scope of This Environmental Analysis

History of the Scoping and Planning Process

A project announcement letter requesting comments on the proposal was mailed to interested agencies, groups and individuals on January 19, 2018. The project was also published in the Ouachita National Forest Schedule of Proposed Actions. A large number of responses were received from the public through multiple methods including phone calls, in person visits, emails, and more. This project garnered a large amount of interest and response from the community. In response to the initial interest from the community, additional outreach efforts were undertaken. An "After Hours" question and answer session was held on February 13th, 2018, an Open House meeting was held on April 23rd, 2018, and a Field tour open to the public was held on July 18th, 2018. Additional fact sheets and press releases were also published and made available to the public. A video series discussing proposed activities and treatments was also developed and published online for public viewing.

Relevant Planning Documents

The following documents directly influence the scope of this environmental analysis:

- Fire Behavior Field Reference Guide (PMS 473, July 2017)
- Landfire Program (Landscape Fire and Resource Management Planning Tools)
- National Cohesive Wildfire Strategy Action Plan
- Revised Land and Resource Management Plan for the Ouachita National Forest (Revised Forest Plan, USDA Forest Service, 2005a), and the accompanying Final Environmental Impact Statement (FEIS, USDA Forest Service, 2005b)
- Southern Group of State Foresters Wildfire Risk Assessment Portal (SouthWRAP) (Southern Group of State Foresters, 2018)
- Travel Analysis Report for the Hochatown Wildland Urban Interface Vegetation Management Project

The Revised Forest Plan guides all natural resource management activities for the Ouachita National Forest. The forest management direction, communicated in terms of Desired Conditions (pp. 6-26); Strategies (pp. 27-72); and Design Criteria (pp. 73-123) that apply to the forest lands identified in this proposal are incorporated by reference.

The treatments described in the Hochatown Wildland Urban Interface Vegetation Management Project Environmental Assessment are consistent with the management direction of the Revised Forest Plan and are typical of those for which environmental effects are disclosed in the FEIS.

Issues

During the scoping and subsequent outreach efforts, comments received were grouped into broad categories that were then developed into issue statements used to develop alternatives to the Proposed Action.

Issue: The proposed action should not occur because any management around the Hochatown area would adversely impact cabins, recreation, and other interests.
Alternative: The IDT felt the No Action Alternative already adequately addresses this issue.

Issue: Herbicide use in proximity to cabins, homes, and municipal water source (Broken Bow Lake) may adversely impact public health.
Alternative: No Herbicide Use

Issue: Seedtree and other even aged regeneration harvests are unnecessary and may adversely affect the scenic quality of the forest around homes, vacation cabins, and other recreation areas.
Alternative: Uneven Aged Management

Issue: Close proximity of proposed firelines to homes and cabins may adversely affect scenic and recreation quality, increase access to illegal OHV use, and negatively affect the local economy.
Alternative: Shaded Fuel Breaks

Decisions to Be Made

The District Ranger must decide which alternative to select. The District Ranger must also determine if the selected alternative would or would not be a major Federal action, significantly affecting the quality of the human environment.

Chapter 2
Alternatives Including the Proposed Action

Alternatives Documented in Detail

No Action

In this alternative, no management activities other than those previously permitted and approved activities would continue in the project area:

- Road maintenance – normal and emergency road maintenance would continue on all existing roads.
- Fire suppression – natural caused fires may be suppressed unless appropriate conditions allow for it to be used as a management tool to accomplish resource needs. Human-caused fires by accident or intention would be suppressed.
- Prescribed fire ~ the use of prescribed fire will continue to be implemented, however the areas treated and treatment effectiveness will continue to be limited.
- Off Highway Vehicle – OHV use of the area would continue under the Travel Management Project for the Ouachita National Forest.
- Camping would continue under the current rules of the Ouachita National Forest. Special restrictions would apply during times of wildfire threat.
- Hunting and Fishing would continue under the rules of the Oklahoma Department of Wildlife Conservation.
- Firewood cutting would continue under the permitting rules of the Ouachita National Forest, the public would continue to harvest firewood.

Proposed Action

Description of Treatments (See Appendix A for list of activities by compartment and stand. See Appendix B for maps displaying activity locations).

Seed Tree Regeneration Harvest ST (even age regeneration harvest) – A timber harvest cut designed to obtain natural regeneration from seed trees left for that purpose. Approximately 10-15 sq. ft. of pine, 5-10 sq. ft. of hardwood basal area per acre is retained in the overstory. Seed trees are retained indefinitely. This cut would establish a single-aged stand. This treatment differs from a traditional seed tree by retaining a mix of hardwoods and pines in the overstory after regeneration. Trees harvested in these areas may be utilized for public firewood or commercial sale. The location of these openings would be located a minimum of 150' from private property boundaries and at least 1/8th of a mile from other even aged regeneration openings. To facilitate natural pine regeneration, adequate site preparation is needed to disturb the soil surface in the newly created openings. Competing vegetation may be removed manually with chainsaws, heavy equipment, scarifying, ripping, prescribed fire, herbicide application and/or the use of a large steel drum pulled behind a bulldozer to chop. If warranted, the

herbicide triclopyr, imazapyr, imazapic and/or glyphosate may be applied using either hack-and-squirt or foliar spray by hand method. When possible, site preparation activities will coincide with adequate cone crops. If after five years there are fewer than 150 pine seedlings per acre, the area will be hand planted with genetically improved shortleaf pine seedlings. Where established regeneration is present, seedlings may regenerate too densely causing overcrowded conditions, requiring pre-commercial thinning and/or release.

The management practice of seedtree harvest has been selected to accomplish regeneration of shortleaf pine in the 37-acre Compartment 1841 Stand 6 and the 37-acre Compartment 1842 Stand 9. The maximum size of regeneration area in MA 16 is 20 acres for pine and pine-hardwood forest types. The Revised Forest Plan provides that maximum size of regeneration areas may be exceeded with approval of the Forest Supervisor up to a maximum of 80 acres for pine and pine-hardwood forest types (FR009/Table 3.2, footnote 1, p. 81; Table 3.15, footnote 1, p. 110). Utilization of seedtree as a harvest method and applying treatment to no more than 80 contiguous acres are consistent with the objective of the Revised Forest Plan to regenerate shortleaf pine and native hardwoods.

Clearcut CC (even aged regeneration harvest) – A timber harvest cut designed to remove all overstory trees from the site to allow for artificial regeneration of a different tree species. All loblolly pines would be removed from the site to allow for the regeneration of a shortleaf pine stand. Hardwoods will be protected from harvest. The site will use site preparation to prepare for planting and will then be hand planted with containerized shortleaf to restore the stand to a native tree species.

The management practice of clearcut harvest has been selected to accomplish replacement of this forest type that is offsite ([Revised Forest Plan] OBJ11, p. 60) in the 56-acre Compartment 1877 Stand 18. The Revised Forest Plan provides that maximum size of regeneration areas may be exceeded with approval of the Forest Supervisor up to a maximum of 80 acres for pine and pine-hardwood forest types (FR009/Table 3.2, footnote 1, p. 81; Table 3.15, footnote 1, p. 110). This proposed management action is based on reasonable and prudent silvicultural practices of Ouachita National Forest lands and is optimal treatment for the primary purpose of restoring shortleaf pine. Utilization of clearcutting as a harvest method and applying treatment to no more than 80 contiguous acres, are consistent with the objective of the Revised Forest Plan to replace off-site loblolly pine with shortleaf pine and native hardwoods.

Group Selection GS (uneven aged regeneration harvest) - Commercial timber harvest that will install irregularly shaped openings within the stand from ¼ to 2 acres in size. These will be scattered across the stand with the intent to initiate regeneration in these openings. The matrix surrounding these gaps will be thinned to improve residual tree growth and vigor. Following harvest, the irregular gaps will be treated with a site preparation, either mechanical or chemical, and then allowed to naturally regenerate from seed sources left on site. To facilitate natural pine regeneration, adequate site preparation is needed to disturb the soil surface in the newly created openings. Competing vegetation

may be removed manually with chainsaws, heavy equipment, scarifying, ripping, prescribed fire, herbicide application and/or the use of a large steel drum pulled behind a bulldozer to chop. If warranted, the herbicide triclopyr, imazapyr, imazapic and/or glyphosate may be applied using either hack-and-squirt or foliar spray by hand method. When possible, site preparation activities will coincide with adequate cone crops. If after five years there are fewer than 150 pine seedlings per acre, the area will be hand planted with genetically improved shortleaf pine seedlings. Where established regeneration is present, seedlings may regenerate too densely causing overcrowded conditions, requiring pre-commercial thinning and/or release.

Commercial Thinning CT (intermediate harvest) - Stands are thinned to a total residual basal area of 60-70 square feet per acre based on the average stand diameter and community type as listed in Table 3.6 Thinning Guide by Community Group (Revised Forest Plan). Damaged, diseased, suppressed, and poorly formed trees would be targeted first for removal. These areas may be made available for commercial sale. Hardwood will be thinned and will be made available for commercial or firewood sale.

Mechanical/Manual Site Preparation - Competing vegetation may be removed manually with chainsaws, heavy equipment and/or ripping. This will be used in lieu of or in addition to other site prep methods to ensure areas are properly prepared for future seed/seedlings. These areas may be made available for firewood or commercial sale.

Chemical Site Preparation - After pine regeneration harvest, hardwoods would be reduced to 20% of the residual basal area of pine using herbicide application in the form of foliar spray, stem injection, and/or chainsaw fell and cut surface spray. A minimum of 5 square feet per acre of basal area of overstory hardwoods would be retained where available. In modified seed tree harvest areas one-half acre clumps of hardwoods per 20 acres of harvest area would be retained in order to create den trees. These areas may be made available for firewood or commercial sale.

Hand Plant Shortleaf Pine - Hand planting of shortleaf pine seedlings will be 400-600 trees per acre spacing. If adequate amounts of pine regeneration (150 trees per acre) are not established, within 5 years in natural regenerated areas, these areas would be chopped, site prepped, and pine seedlings would be re-planted to meet target stocking levels.

Timber Stand Improvement - Pre-commercial Thinning PCT/Release - Regenerated pine stands between 5 and 10 years of age would be thinned to a maximum of 700 trees per acre, averaging a 10 x 10 foot spacing, using hand tools or herbicide application as described on the previous page. Leave trees would be free of all competing vegetation such as vines and woody stems to ensure survival, reduced susceptibility to insects and disease, and increase growth of the residual stand. Poorly formed trees would also be removed. This may be accomplished manually with hand tools (e.g. chainsaws) or with the herbicides applied as a foliar spray or cut surface application to remove the overtopping and competing vegetation and brush. A foliar spray may be applied to areas with vegetation less than six feet tall and with pine regeneration that does not require

thinning. A cut surface application is employed in areas with vegetation greater than six feet tall and/or with pine regeneration requiring thinning. During any activities, sufficient hardwood trees would be left scattered throughout the stand to ensure a 10 to 30 percent hardwood component in the stand. When selecting hardwood trees, preference would be given to mast producers. Final stocking after treatments would be 250-500 pine stems per acre. These areas may be made available for commercial sale.

Wildlife Stand Improvement – Midstory Removal - This is achieved by using a combination of fire, chainsaws and/or herbicides to remove suppressed and intermediate trees. By reducing the midstory, it will allow more light to filter throughout the forest canopy and spur the growth of ground-level vegetation including grasses, forbs, legumes, and herbaceous plants. The results of this treatment include increased quality habitat for many wildlife species including white-tailed deer, northern bobwhite, eastern wild turkey, bachman's sparrow, brown-headed nuthatch, and diana fritillary. Midstory trees less than 10 inches diameter at breast height would be removed. Trees not to be removed regardless of size include all fruiting trees, such as dogwood, plum, cherry, etc., and any snags or den trees. These areas may be available for firewood.

Wildlife Pond Construction – Ponds up to ½ acre in size will be constructed in order to provide permanent water sources for wildlife, including mammals, birds, and amphibians.

Bluebird Nest Box Construction - Nest boxes for cavity nesting songbirds (bluebirds, titmice, chickadees, and nuthatches) would be placed within the stand proposed for clearcutting.

Erosion Control/Pollinator Habitat Improvement Seeding – In areas along roads which are mechanically cleared of vegetation, native wildflowers and grasses would be planted to increase nectar sources/pollinator habitat and provide erosion control.

Mechanical Removal of Vegetation along Forest Service Roads (Fuel Breaks) - Mechanical fuels treatments will occur along selected Forest Service roads within the Project Area. A total of 30 feet on both sides of the road will be treated to reduce fuel loading. Where a road serves as a property boundary, only the Forest Service side will be treated. Within the first 15 foot from the edge of the road, all over-story and mid-story vegetation will be removed, these areas shall be maintained for prescribed fire and wildfire suppression. Within the second 15 feet (for a total of 30 feet) will reduce the over-story and mid-story vegetation to a desired basal area of 40-50 ft^2/ac.

Fire Line Construction - Mechanical fuels treatments and fire line construction will occur where private property interfaces with National Forest administered land. A maximum of 45 feet will be impacted along property boundaries with both fire line creation and fuels removal. Within the 45 feet, a 15 foot fire line will be placed by removing all mid-story and over-story vegetation. The remaining 30 feet, on one or both sides of the fire line, will be treated to a targeted basal area reduction resulting in a residual 40-50 ft^2/ac. The fire line may vary within the total 45 feet of impact due to site specific conditions. Where slope, drainages, or other site specific issues limit the effectiveness/use of mechanical equipment, less impactful methods on soil and vegetation may be used, i.e. handline. These fire lines shall be maintained for prescribed fire implementation and wildfire suppression.

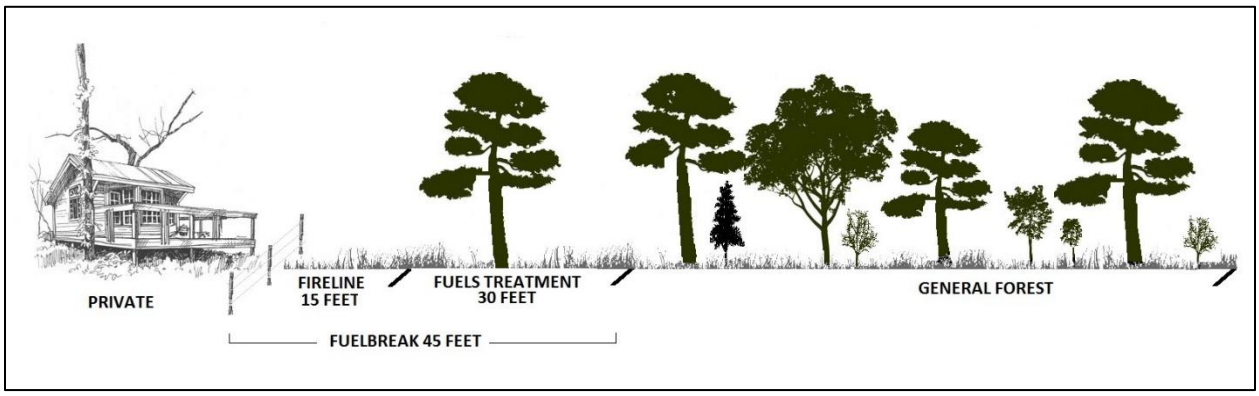

FIGURE 2 – PROPOSED ACTION FIRELINE AND FUELS TREATMENT

New Road Construction and Relocation – New road construction and road relocation would be needed to access harvest areas and will support management activities. This includes new roads, existing road to be relocated, and decommissioned roads that are proposed to be added to the National Forest Transportation System.

New roads would need to be constructed for access to harvest areas and proposed management activities. Road (RC-1) would need to be relocated for access to access harvest areas and to improve the alignment of the roads to improve drainage, reduce sediment runoff, and increase safety for administrative use including fire suppression. Decommissioned roads would need to be reconstructed and added to the National Forest Transportation System to access harvest areas and management activities.

System Road Reconstruction – System road reconstruction would be required to support management activities, reduce erosion and sedimentation, and ensure safe travel on the existing road network. Activities could include any road improvements or realignment that results in an increase of an existing road's traffic service level, expands its capacity, changes its original design function, or relocates an existing road or portions of an existing road and treatment of the old roadway.

Temporary Road Construction – Temporary road construction is necessary to access harvest areas. Per Revised Forest Plan design criteria, temporary roads would be decommissioned, revegetated, and re-contoured upon termination of management activity. After harvest, these roads would be closed with earthen berms or gates, fertilized, seeded and planted with native warm and cool season grasses and non-persistent cultivars and utilized as temporary wildlife openings.

No Herbicide Use Alternative

This alternative addresses Forest direction requiring analysis of an alternative to herbicide use when feasible and practical to accomplish management purposes. Herbicide application for site preparation, pre-commercial thinning/release, and midstory removal would not occur. These activities would be accomplished manually with chainsaws and/or other mechanical means. All other activities are the same as those proposed under the Proposed Action.

Uneven Aged Management Alternative

This alternative addresses public concerns with even aged management. In this alternative, no seedtree harvests would take place. Group selections GS (uneven aged regeneration harvests) would be implemented. This would lower the amount of acres moved to a younger age class and keep the majority of the project area in older age classes. All other activities are the same as those proposed under the Proposed Action.

Shaded Fuel Breaks Alternative

This alternative addresses public concerns with the installation of fuel breaks and fire lines directly adjacent to property boundaries and the potential impacts to visual and scenic quality. A fuels reduction treatment will be installed along the property boundaries for the first 100 feet and will be treated to a targeted basal area reduction resulting in a residual 40-50 ft^2/ac. The next 30 feet will be treated with a complete mid-story and over-story removal and will serve as the fire line. The next 20 feet will be treated with a fuels reduction to a targeted basal area reduction resulting in a residual 40-50 ft^2/ac. Combined, this will result in a total area of impact along property boundaries of 150 feet into land administered by the National Forest System. All other activities are the same as those proposed under the Proposed Action.

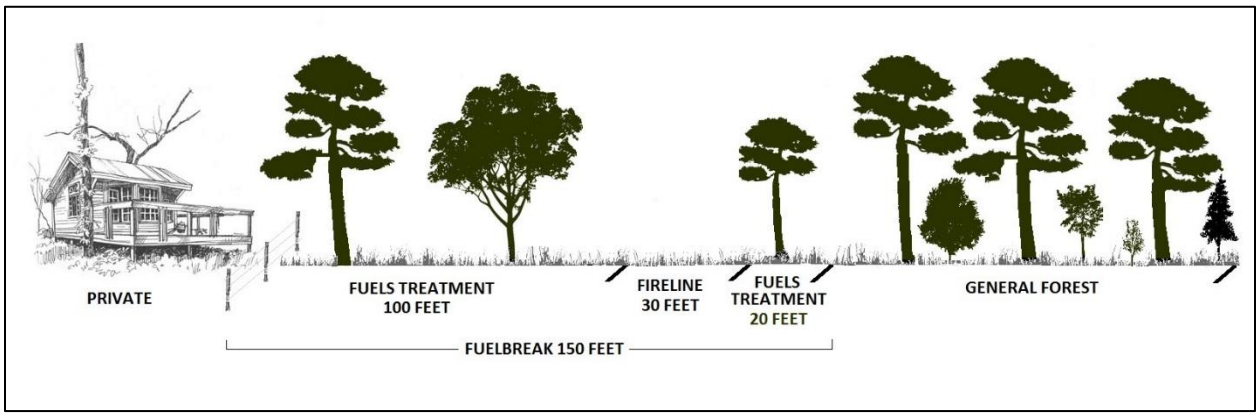

FIGURE 3 – SHADED FUELS BREAK FIRELINE AND FUELS TREATMENT

Technical Requirements

The technical requirements described below apply to the Proposed Action, the No Herbicide, the Uneven Aged Management, and the Shaded Fuels Break Alternative.

Cultural Resources

The following measures only apply to cultural resource sites that are unevaluated, eligible for listing, or listed in the National Register of Historic Places.

CR1: Site Avoidance During Project Implementation

Avoidance of cultural resources (CR) will require the protection from effects resulting from the undertaking. Effects will be avoided by (1) establishing clearly defined site boundaries and buffers around archeological sites where activities occur that might result in an adverse effect. Buffers will be of sufficient size to ensure that integrity of the characteristics and values which contribute to, or potentially contribute to, the properties' significance will not be affected, and (2) routing proposed new roads, temporary roads, log landings and skid trails away from cultural resources.

CR2: Site Protection during Fireline Construction and Use

(1) *Firelines.* Cultural resources located along existing non-maintained woods roads used as fire lines will be protected by hand-clearing those sections that cross the sites. Although these roads are generally cleared of combustible debris using a small dozer, those sections crossing archeological sites will be cleared using leaf blowers and/or leaf rakes. There will be neither removal of soil, nor disturbance below the ground surface, during fireline preparation. Cultural resources and features located along proposed routes of mechanically-constructed firelines, where firelines do not now exist, will be avoided by routing fireline construction around cultural resources. Sites that lie along previously constructed dozer lines from past burns where the firelines will be used again as firelines, will be protected during future burns by hand clearing sections of line that cross the site, rather than re-clearing using heavy equipment. Where these activities will take place outside stands not already surveyed, cultural resources surveys and regulatory consultation will be completed prior to project implementation. Protection measures, CR1, CR3, and CR4, will be applied prior to project implementation to protect cultural resources.

(2) *Post-Firelines Monitoring.* Post- Firelines construction monitoring may be conducted at selected sites to assess actual and indirect effects of the Firelines on the sites against the expected effects. State Historic Preservation Office consultation will be carried out with respect to necessary mitigation for any sites that suffer unexpected damage during the Firelines construction or from indirect effects following the Firelines creation.

CR3: Site Protection during Uneven Aged Timber Management

Avoidance of cultural resources (CR) will require the protection from effects resulting from the undertaking. Effects will be avoided by (1) establishing clearly defined site boundaries and buffers around archeological sites where activities occur that might result in an adverse effect.

Buffers will be of sufficient size to ensure that integrity of the characteristics and values which contribute to, or potentially contribute to, the properties' significance will not be affected, and (2) routing proposed new roads, temporary roads, log landings and skid trails away from cultural resources.

Post-Harvest Monitoring. Post-harvest monitoring may be conducted at selected sites to assess actual and indirect effects of the harvests on the sites against the expected effects. State Historic Preservation Office consultation will be carried out with respect to necessary mitigation for any sites that suffer unexpected damage during the harvest or from indirect effects following the harvest.

CR4: Site Protection during Shaded Breaks

Avoidance of cultural resources (CR) will require the protection from effects resulting from the undertaking. Effects will be avoided by (1) establishing clearly defined site boundaries and buffers around archeological sites where activities occur that might result in an adverse effect. Buffers will be of sufficient size to ensure that integrity of the characteristics and values which contribute to, or potentially contribute to, the properties' significance will not be affected, and (2) routing proposed new roads, temporary roads, log landings and skid trails away from cultural resources.

Cut and Leave: Several types of projects may occur in which vegetation is cut by hand and allowed to remain on the ground during which disturbance to archeological resources is very unlikely to occur. These may include overstory removal, mid-story removal, insect infestation treatments, pre-commercial thinning of pine plantations, and chainsaw site prep. In all these cut-and-leave actions, vegetation to be removed will be cut with chainsaws and allowed to remain on the ground within the improvement areas. No heavy equipment is used in the process nor are new roads constructed for access Cut and Leave will not be categorically excluded in cases where historic properties with above ground features are included within the project area.

Post-Shaded Breaks Monitoring. Post-shaded breaks monitoring may be conducted at selected sites to assess actual and indirect effects of the shaded breaks creation on the sites against the expected effects. State Historic Preservation Office consultation will be carried out with respect to necessary mitigation for any sites that suffer unexpected damage during the shaded break creation or from indirect effects following the shaded break construction.

CR5: Other Protection Measures

If it is not feasible or desirable to avoid an historic property that may be harmed by a project activity (CR1), then the following steps will be taken: (1) In consultation with the Oklahoma SHPO, the site(s) will be evaluated against National Registry Historic Places (NRHP) significance criteria (36 CFR 60.4) to determine eligibility for the NRHP. The evaluation may require subsurface site testing; (2) In consultation with the Oklahoma SHPO, tribes and nations, and with the Advisory Council of Historic Preservation (ACHP) if required, mitigation measures will be developed to minimize the adverse effects on the site, so that a finding of No Adverse Effect results; (3) The agreed-upon mitigation measures will be implemented prior to initiation of activities having the potential to affect the site

CR6: Discovery of Cultural Resources during Project Implementation

Although cultural resources surveys were designed to locate all NRHP eligible archeological sites and components, these may go undetected for a variety of reasons. Should unrecorded cultural resources be discovered, activities that may be affecting that resource will halt immediately; an archaeologist will evaluate the resource, and consultation will be initiated with the SHPO, tribes and nations, and the ACHP, to determine appropriate actions for protecting the resource and mitigating adverse effects. Project activities at that locale will not resume until the resource is adequately protected and until agreed-upon mitigation, measures are implemented with SHPO approval.

Soils

Allow heavy equipment operations on hydric soils, soils with a severe compaction hazard rating, and floodplains with frequent or occasional flooding hazard only during the months of July through November. Operations during December through June are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW001, p. 74)

Allow heavy equipment operations on soils that have a high compaction hazard rating only during the months of April through November. Operations during December through March are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW002, p. 74)

These standards apply to the stands displayed in the tables below *where operations would occur on* soil mapping units with a moderate-high, high and/or severe compaction hazard rating. If the resulting timber sale payment units do not include any high risk soils, then limited operating seasons would not apply.

STANDS REQUIRING A LIMITED OPERATING SEASON SW001 (TABLE 2.1)
None Identified.

STANDS REQUIRING A LIMITED OPERATING SEASON SW002 (TABLE 2.2)

Compartment	Stand
1877	1
1877	2
1877	5

Compartment	Stand
1877	6
1877	8
1877	10

Compartment	Stand
1877	15
1877	18
1877	19

Soil loss from management actions will not exceed the estimated Forested T-factor for each soil or soil map unit, based on the cumulative time period between soil disturbing management actions. (Revised Forest Plan, SW003 (3), p. 74)

Scenery/Recreation

The proposed action includes harvest activities (woodland development) in Compartment 1877, the Skyline Trail operated and maintained by the Oklahoma Tourism and Recreation Department, Beavers Bend State Park on National Forest System Lands is located within this Compartment. To remove impacts to the trail, the harvest activities unit boundary shall be coordinated with Beaver's Bend State Park.

The following technical requirements are informed by the Southern Region's Scenery Treatment Guide (April, 2008).

- Flowering and other visually attractive trees and understory shrubs are favored when leaving vegetation.
- For areas with a moderate to high Scenic Integrity Objective (SIO), leave tree marking or unit boundary is applied so as not to be visible within 100 feet of concern level 1 and 2 open roads.
- For areas with a moderate to high SIO, log landings, roads, and bladed skid trails should be located out of view, when possible, to avoid bare mineral soil being seen from concern level 1 and 2 open roads.
- The visual impact of roads and constructed firelines should be blended so they remain subordinate to the existing landscape character in size, form, line, color, and texture.
- Openings should be organically shaped. Edges should be shaped and/or feathered where appropriate to avoid a shadowing effect in the cut unit.
- Cut and fill slopes are re-vegetated to the extent possible.
- All harvest areas within a high SIO will be cut to an irregular shape and follow the landscape/contours.

The following technical requirements for trails are of particular importance to the portions of the Skyline Trail that is coincident with Forest Service System Lands within the WUI.

- Clear, obvious, and redundant signs should be placed on the trail before entering this project area pointing out increased activities on and adjacent to the trail. Any trail closure signs should be placed at the nearest trail heads or access points notifying users of the trail being closed. Extra attention should be given to any portion of the trail that crosses FS 50889 road that is now open to motorized use through a Special Uses Permit.
- All signs, parking areas, or other trail structures should be protected while stand improvement activities are taking place. Replace any damaged trail structures with like material as soon as possible if damage occurs.
- Any vegetation management activities will need to coordinated with the Beaver's Bend State Park, and the Skyline Trail shall either closed until after the prescribed fire treatment is complete, or signs shall be placed at entrance and exit points along the trail.
- Any opportunities to enhance the scenic integrity of the trail should be taken.
- Avoid any activities that will take away from the special features of the trail.
- Any activities that will affect the trail tread or corridor where it is concurrent with the existing road or access route should be repaired as soon as possible. For any section of the trail that remains open during harvesting activities directionally falling timber away from the trail/road and trail head is recommended.

- Any activities inside or outside the prescribed stand boundaries that directly impact the trail system tread, corridor, or access should be mitigated if possible or repaired in a timely manner.

Public Health and Safety

During fuel treatment, signage will be posted along travel-ways as needed notifying the public of harvest traffic along the road. Make notifications of activities and limit activities during peak recreational periods, such as holiday's and local events.

During active harvest activities, traffic control devices (or signs) will be required to be maintained on roads in the project area to provide user with adequate warning of hazardous conditions associated with commercial harvest activities.

Commercial hauling to the following roads will be restricted to address concerns raise by the public and to reduce conflicts due to mixed commercial and public use:

- Carson Creek Road
- Golf Course Road
- Cedar Creek Road
- Stevens Gap Road
- North State Highway 259A
- South State Highway 259A
- Mako Road (Access Road to Timber Ridge Estates).

This following restriction will apply for commercial hauling to the following roads listed above:

- No hauling permitted on weekends March through September beginning Friday 12PM and Ending Sunday at 10PM.
- No hauling permitted on Memorial Day, Labor Day.
- No hauling permitted during the Owa-Chito Festival and Fall Festival in the state park beginning Wednesday at 12PM and ending Sunday at 10PM.

Monitoring

The Revised Forest Plan lists monitoring activities for the Ouachita National Forest. The Forest's monitoring program is designed to evaluate the environmental effects of actions similar to those proposed in this project and also serves to assess the effectiveness of treatments.

Trained contract administrators and inspectors will conduct routine on-site assessments throughout the implantation phases of the project, ensuring that the appropriate design criteria are followed to protect soil stability, water quality and other resources.

Activities that utilize herbicides will be monitored to ensure that all herbicides are used in accordance to label instructions. Form R8-FS-2100-1, Herbicide Treatment and Evaluation Record would be used to monitor all work involving herbicides. Stream samples would also be taken to monitor for offsite movement.

Other Past, Present and Reasonably Foreseeable Future Actions

On October 9th, 2010, a wildfire, the Rock Shop fire, burned through a portion of compartment 1877. This underburned a portion of the project, but crowned out and resulted in overstory mortality of 13 acres. This 13 acres was then salvage logged with the Rock Shop Fire Salvage Sale Project (DM 11/23/10). It was then seeded back to shortleaf pine.

The Mountain Fork West Project was signed on 5/27/2014 (DN) and authorized 98 acres of overstory thinning within compartment 1877.

The Rock Creek Timber Project was signed on 5/6/2016 (DN) and authorized overstory thinning on 199 acres in compartment 1841 and 135 acres in compartment 1842. Combined with the acres of overstory thinning from the Mountain Fork West Project, these total acres were sold as the Government Mountain Timber sale in fiscal year 2017.

The Broken Bow Rx Burn Project was signed on 4/12/2017 (DN) and authorized the entire project area (6251 acres) for prescribed burning and associated fireline construction. This project also authorized prescribed burning on lands administered by the National Forest around Broken Bow Lake.

Private land ownership – Private owners can be expected to continue their current land use practices (i.e. residential, agriculture, etc). Current tourism focused cabin construction is expected to increase on land bordering the National Forest. Recreation opportunities and businesses are also being constructed at increased rates within the area known as Hochatown.

Other past activities within the Hochatown Wildland Urban Interface Vegetation Management Project area are evident in descriptions of the present conditions for each resource section analyzed in Chapter 3. Other ongoing activities are listed above in the description of the No Action Alternative.

Summary Comparison of Alternatives

COMPARISON OF ACTIONS BY ALTERNATIVE (TABLE 2.3)

Action (measure)	No Action	Proposed Action	No Herbicide	Uneven Aged	Shaded Fuel Breaks
Seed tree regeneration harvest (acres)	0	481	481	0	481
Commercial thinning CT (acres)	0	4,564	4,564	2,564	4,564
Group selection harvest	0	664	664	3,057	664
Clearcut regeneration harvest	0	56	56	56	56
Chemical site preparation (herbicides) (acres)	0	1,163	0	2,442	1,163
Mechanical/manual site preparation (no herbicides) (acres)	0	37	1,201	671	37
Hand plant shortleaf pine seedlings (acres)	0	56	56	56	56
Timber stand improvement – Release (manual/chemical) (acres)	0	1,201	1,201	3,113	1,201
Timber stand improvement – Precommercial thin (manual/chemical) (acres)	0	1,145	1,145	3,057	1,145
Wildlife stand improvement – midstory removal (manual/chemical) (acres)	0	4,564	4,564	2,564	4,564
Wildlife pond construction (each)	0	14	14	14	14
Bluebird nest box construction (each)	0	28	28	28	28
Erosion control/Pollinator habitat improvement seeding (acres)	0	196	196	196	196
Mechanical removal of vegetation along existing roads (acres)	0	196	196	196	196
Fire line construction and fuelbreak (miles/acres)	0	19.35/106	19.35/106	19.35/106	19.35/352
New road construction & relocation (miles)	0	5.02	5.02	5.02	5.02
Temporary road construction	0	10	10	10	10

COMPARISON OF ENVIRONMENTAL EFFECTS BY ALTERNATIVE (TABLE 2.4)

Environmental Effect (measure)	No Action	Proposed Action	No Herbicide	Uneven Aged	Shaded Fuel Breaks
Additional Sediment Delivery by Watershed (tons/year)					
Broken Bow Lake Dam 111401080306	107	672	672	554	726
Lick Creek – Mountain Fork 111401080307	218	692	692	654	752
Yashau Creek 111401070405	202	455	455	426	532
Stephens Branch – Lukfata Creek 111401070403	257	302	302	302	314
Yanubbee Creek – Crooked Creek 111401070407	252	306	306	306	321
Open Road Density MA 16 (mi/mi^2)	0.48	0.48	0.48	0.48	0.48
Early Seral Habitat Created (acres)	0/0	839	839	358	1,085
Scenic Integrity Objectives Met for MA 16 (Revised Forest Plan p. 109)	Yes	Yes	Yes	Yes	Yes
Below SW003 Allowable Soil Loss	Yes	Yes	Yes	Yes	Yes
Herbicide Hazard Quotients > 1	No	Yes	No	Yes	Yes

COMPARISON OF OBJECTIVES MET BY ALTERNATIVE (TABLE 2.5)

Objective (measure)	No Action	Proposed Action	No Herbicide	Uneven Aged	Shaded Fuel Breaks
Miles of urban interface protected (miles of new fuelbreak at FS boundary)	0	19.35	19.35	19.35	19.35
Improve Vegetation Condition Class, moving toward Desired Condition in WUI (acres of overstory reduction (harvest)/ acres of midstory removal)	0	5,228/ 4,564	5,228/ 4,564	5,621/ 2,564	5,228/ 4,564
Reduce fuel loadings along roads for ingress and egress to increase public safety (miles of roads with fuels treatments)	0	29	29	29	29
Improve the health and vigor of forest stands and improve stand quality (acres of timber stands treated resulting in reduced basal areas)	0	5,228	5,228	5,621	5,228
Provide grass-forb and seedling-sapling habitat conditions. (% of suitable acres in early seral habitat/ % from even-aged regeneration harvests)	0/ 0	13/ 9	13/ 9	6/ 1	17/ 9
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products. (volume harvested – 100 cubic feet (ccf))	0	63,600	63,600	63,700	63,600

Objective (measure)	No Action	Proposed Action	No Herbicide	Uneven Aged	Shaded Fuel Breaks
Develop, operate, and maintain the road system to meet the requirements of the proposed actions, protect the environment, and provide reasonable and safe access. (miles of system road reconstruction and relocation/miles of temporary road construction)	0	5.02/ 10	5.02/ 10	5.02/ 10	5.02/ 10

Chapter 3
Affected Environment and Environmental Consequences

Air Quality

Present Conditions

The project area lies within McCurtain County on lands designated as Class II with respect to the air resource. The Clean Air Act defines a Class II area as "a geographic area designated for a moderate degree of protection from future degradation of the air quality." A Class I Area is a geographic area designated for the most stringent degree of protection from future degradation of air quality. The closest Class I Area is the Caney Creek Wilderness Area, about 30 miles east of the project area. There is another Class I Area to the northeast, Upper Buffalo Wilderness Area, on the Ozark National Forest.

Existing emission sources occurring within the project area consist mainly of mobile sources. These would include, but are not limited to, combustion engines (such as those found in motor vehicles); dust from unpaved surfaces; smoke from local, county, agricultural, and forest burning; restaurants; and other activities. Of the six criteria air pollutants, all counties in the state are designated "attainment/unclassifiable" or "unclassifiable" (US Environmental Protection Agency, 2018).

No Action

Direct and Indirect Effects

There is no proposed prescribed burning in the no action alternative. Therefore there would be no direct effects to air quality.

This alternative would have no immediate (direct) impacts on air quality since no actions would be implemented. Indirectly, this alternative could potentially impact air quality later due to resulting build-up of forest fuels, which could cause more smoke over longer durations if wildfires were to burn areas not treated.

In the absence of fuels treatments, fuel loading increases. Wildfires occurring in areas with increased fuel loadings produce more smoke and are more difficult to contain and therefore often burn for a longer duration. Wildfires may occur at times when wind carries smoke into sensitive areas, and at times when smoke dispersal is poor. The 2014 National Emissions Inventory reports that wildfire emissions in McCurtain county where the activities are proposed are currently 148 tons of fine particulate matter per year (https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data); increased fuel loadings would likely result in greater annual emissions from wildfires.

Cumulative Effects

No cumulative effects would occur because no prescribed burning would be conducted under the No Action Alternative; there would be no additive effect.

Proposed Action, No Herbicide, Uneven Aged, and Shaded Fuel Breaks

Direct and Indirect Effects

The direct and indirect effects of the action alternatives would be similar to the no action alternative. No prescribed burning would occur in this alternative. Indirect effects would be somewhat less than the no action alternative as the timber harvests would help to reduce the fuel loading. It would however put fuels on the ground from the tops, etc. which could ignite more readily and spread faster if there was a wildfire. This would only be a temporary effect as woody debris from timber harvests are usually gone within three years or are no longer susceptible to wildfires.

Cumulative Effects

No cumulative effects would occur because no prescribe burning would be conducted under the action alternatives; there would be no additive effect on air quality.

Cultural & Historical Resources

Present Conditions

Former investigations have resulted in 1,377 acres of archaeologically surveyed areas and seven newly documented sites. Heritage crews researched and revisited six previously recorded sites to ensure their significance. Cultural Resource Management firm, American Resources Group, Ltd., prepared and submitted a Cultural Resources Report for the Oklahoma State Historic Preservation Office (SHPO), the Oklahoma State Archeologist, and the federally recognized tribes interested in undertakings in McCurtain County: Caddo Tribe, Chickasaw Nation, Choctaw Nation of Oklahoma, Osage Nation, Quapaw Tribe of Oklahoma, and Wichita and Affiliated Tribes.

Oklahoma District will protect eligible and undetermined sites from any proposed management activities. If crews, personnel, or public discover any unknown heritage resources during project activity, within the project areas, the District and Forest Archaeologists will be notified immediately. They will make an evaluation, in consultation with SHPO and the Tribal Historic Preservation Officers (THPOs), to determine appropriate action. Personnel will suspend all activity at that location until that determination is complete.

Known Cultural Resources – Heritage personnel have identified 13 archeological sites, previously and newly discovered, in or near the project area as a result of cultural resources inventory surveys. Of the newly identified properties, three were determined significant and eligible for inclusion on the National Register of Historic Places (NHRP). Additionally, four archeological sites are determined not eligible and require no further consideration during project implementation. Of the previously recorded sites, two site determined not eligible and require no further consideration during project implementation and four sites were unevaluated and therefore be protected from any proposed management activities.

Site Locations Not Yet Known – Cultural resource surveys may not be complete for certain activities because additional planning may be required prior to implementation. These activities include, but are not limited to:

- Burn boundary and fireline construction locations
- Temporary roads, skid trails, and log landings outside areas already surveyed
- Road construction, reconstruction, maintenance, conversion, or decommissioning activities involving ground disturbance occurring outside areas already surveyed
- New pond construction for wildlife water sources

Heritage personnel will conduct surveys for these areas and will complete regulatory and tribal consultation prior to implementation.

Effects Analysis

The scope of the analysis for potential effects to cultural resources includes a portion of the Hochatown Wildland Urban Interface Project area and considers the proposed activities within the treatment area as well as access to these areas.

An effect to a cultural resource is the "…alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16(i)). Any project implementation activity that has potential to disturb the ground has potential to affect archeological sites, as does the use of fire as a management tool. Specific activities that have potential to directly affect cultural resources include:

> Timber harvesting and associated log landings, skid trails, and temporary roads, prescribed burning and associated fireline construction and road maintenance, construction or reconstruction where ground disturbance takes place outside existing right-of-way area.

Proposed activities that do not have potential to affect cultural resources, and therefore, are not considered undertakings for purposes of this project include:

> Non-commercial thinning, timber stand improvements, on-going maintenance of existing Forest roads or reconstruction of previously surveyed roads where ground disturbance does not take place outside existing road prisms and existing drainage features, rehabilitation/closure of temporary roads, log landings, and skid trails using non-ground disturbing methods, road decommissioning using non-ground disturbing methods, and non-native invasive plant species control using non-ground disturbing methods.

Furthermore, proposed activities have the potential to affect cultural resources by encouraging increased visitor use to those areas of the Forest in which cultural resources are located. Increased visitor use of an area in which archeological sites are located can render the sites vulnerable to both intentional and unintentional damage. Intentional damage can occur through unauthorized digging in archeological sites and unauthorized collecting of artifacts from sites. Unintentional damage can result from such activities as driving motorized vehicles across archeological sites, as well as from other activities, principally related to dispersed recreation, that lead to ground disturbance. Effects may also include increased or decreased vegetation on protected sites because of an increase in light due to a reduction in canopy outside of the protected buffer.

No Action

Direct, Indirect, and Cumulative Effects

There would be no change in effects from the current condition, and the potential threat to integrity of cultural resources would remain unchanged.

Proposed Action and No Herbicide

Direct and Indirect Effects

Proposed seed tree regeneration, group selection, timber harvest connected action, mechanical removal of vegetation, fire line construction, new road construction possibly (involving road relocation), and other proposed actions can affect cultural resources. Surface artifacts or features may be exposed, disturbed, or removed due to increased access and visibility.

Project components that have potential to directly affect archeological sites are primarily timber, prescribed fire, road management, and some wildlife management activities. Forest personnel can avoid adverse effects to cultural resources resulting from proposed activities provided site avoidance and personnel properly apply site protection measures to the known cultural sites (see Chapter 2, under Technical Requirements). In that instance, project activities would not be expected to adversely affect archeological sites.

Uneven Aged Management

Direct and Indirect Effects

Proposed group selection, timber harvest connected action, mechanical removal of vegetation, fire line construction, new road construction possibly (involving road relocation), and other proposed actions can affect cultural resources. Surface artifacts or features may be exposed, disturbed, or removed due to increased access and visibility.

Project components that have potential to directly affect archeological sites are primarily timber, prescribed fire, road management, and some wildlife management activities. Forest personnel can avoid adverse effects to cultural resources resulting from proposed activities provided site avoidance and personnel properly apply site protection measures to the known cultural sites. In that instance, project activities would not be expected to adversely affect archeological sites.

Shaded Fuels Breaks

Direct and Indirect Effects

Hand and mechanical removal of vegetation, fire line construction, new road construction (possibly involving road relocation), and other proposed actions can affect cultural resources. Surface artifacts or features may be exposed, disturbed, or removed due to increased access and visibility.

Project components that have potential to directly affect archeological sites are primarily timber, prescribed fire, road management, and some wildlife management activities. Forest personnel can avoid adverse effects to cultural resources resulting from proposed activities provided site avoidance and personnel properly apply site protection measures to the known cultural sites (see Chapter 2, under Technical Requirements). In that instance, project activities would not be expected to adversely affect archeological sites.

Cumulative Effects of All Action Alternatives

Eleven archaeological surveys have been conducted within or adjacent to the project area. A review of the technical and short-form reports describing the results of these surveys indicates that site density near the current project area is very low to moderate. Most of the previously conducted investigations were conducted in advance of Forest Service activities related to timber sales, timber thinning, and burning. Other surveys include linear surveys for buried cables, transmission lines, and roads.

Seven of these projects (see below Table) are reported to have authorized approximately 5900 acres of commercial thinning harvest, within the project area, in areas of low to moderate archaeological site densities and include sites eligible for nomination to the National Register of Historic Places. The effects disclosed above would be the same for these projects and would be additive to the cultural resources within the project area.

CULTURAL RESOURCE REPORTS WITHIN PROJECT AREA (TABLE 3.1)

Report Title	Author/ Organization	Date	Area Surveyed/ Sites Recorded
Pine Telephone Buried Cable	J. Briscoe	1994	31 ac./0 sites
Archeological Survey Report on the McCurtain County RWD No. 6 Phase I Waterline Project, McCurtain County, Oklahoma.	J. Briscoe	2009	23 ac./0 sites
Archeological Survey of 485 Acres for Rock Creek East Thinning, Oklahoma Ranger District (Broken Bow), McCurtain County, Oklahoma, Compartments 1841, 1842, and1843.	L. Rue-Harris	2015	485 ac./3 sites
Heritage Resources of 1,116 Acres of Proposed Activities on the Oklahoma RangerDistricts, HY 2014	L. Haikey	2004	1166 ac./2 sites
Report on the Archeological Survey of the Western Farmers electric Cooperative, Transmission Line Reroute, Located in McCurtain County, Oklahoma	C. Cojeen and J. Ballenger	1997	15 ac./0 sites
Cultural Resources Survey Report, Special Use for Kiamichi Electric	K. Coplen	1998	3.6 ac./0 sites
Cultural Resources Survey Report, Panther Creek Area	J. Smith	2001	4175 ac./2 sites

Soils

Present Condition

The majority of the project area, just over 1,700 acres, is comprised of Littlefir-Bismarck complex soil mapping unit. The average slope range is 15 to 35%. This map unit consists of moderately deep to deep, and shallow, clayey and loamy soils on moderately sloping to steep hillsides. Management concerns include shallow depth and very low water holding capacity of Bismarck soils, and a moderate erosion and compaction hazard. See project file for the soil mapping unit legend and soil map.

Prime Farmlands, Wetlands and Floodplains. Proposed management activities would not alter the soil's capacity to remain prime farmland. Soil mapping units identified as being in the 100-year flood plain or as being a hydric soil require special management considerations and evaluations so that proposed actions would not adversely alter the natural values of these areas. In this analysis area, there are no jurisdictional wetlands mapped. There are no hydric soil landforms in this analysis area. Soil map unit 55 depicts floodplain landforms in this analysis area and represents a total of 261 acres of the project area. These mapped areas help to give an approximate determination of the 100-year boundary where their width is determined to be more than 200 feet. No structures are proposed within 100-year floodplains. For detailed information, reference E.O. 11988, E.O. 11990, FSM 2526 and FSM 2527.

No Action

Only the undisturbed natural erosion would be expected to continue. Natural erosion from undisturbed forest soils is very low, generally in the neighborhood of 0.01 to 0.15 tons/acre/year. There would be no management activities conducted on forest soils; no compaction would occur.

Action Alternatives

Erosion – Erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Soils are considered detrimentally eroded when soil loss exceeds soil loss tolerance (Forested T-factor) values. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Forested T-factors and the soils susceptibility to erosion vary by soil and mapping unit. Soils with higher K-factor values and those soil map units with severe erosion hazard ratings require more intensive management efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity. Erosion can best be managed to stay within the Forested T-factor values by leaving sufficient amounts of the forest floor, slash and other onsite woody debris material which typically dominates an effective surface cover, not overly compacting soils which would reduce water infiltration rates and result in increased overland flow rates, and not allowing water to concentrate and channel on roads, skid trails and landings.

The Revised Forest Plan Forest-wide design criteria identify maximum allowable soil loss thresholds (pp. 74-75). In order to determine whether the proposed actions meet these criteria, the Universal Soil Loss Equation (USLE) was used to calculate soil loss resulting from proposed treatments. For this analysis, worst case-modeling scenarios were analyzed for a clearcut and commercial thinning on soil map units with a severe erosion hazard potential.

The total calculated soil loss for the proposed management activities and the maximum allowable soil loss for three-year recovery period are displayed in the table below. These values are based on adequate implementation of erosion control treatment of log decks, temporary roads and primary skid trails (waterbar and seed only).

MAXIMUM ALLOWABLE SOIL LOSS (TABLE 3.2)

Soil Map Unit	Compartment/ Stand	Treatment	Soil Loss (tons/acre)	
			Action Alternative	Allowable
11	1877/18	Clearcut/Site Preparation	9.96	10.50
112	1842/7	Commercial Thinning	6.30	7.65

These worst-case scenarios meet the Forest criteria of staying within the allowable soil loss Forested T-factor. These treatment units, along with other proposed treatment units of less intense soil disturbing management actions, would remain within acceptable limits over the entire project area when erosion control measures are adequately implemented. Any stands requiring additional erosion control measures (mulching) would be listed in Chapter 2, technical requirements.

Compaction – Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration. Compaction can detrimentally impact both soil productivity and watershed condition by causing increased overland flow during storm events and reduced plant growth due to a combination of factors including reduced amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. It is generally acknowledged that all soils are susceptible to soil compaction or a decrease in soil porosity. The soils in this planning area are most susceptible to compaction when wet.

Soil map hazard ratings for compaction are primarily due to low proportions of rock content in the top 6-inches of soil. This situation, when combined with heavy equipment operation on wet soils, can result in unacceptable levels of compaction. To ensure that compaction effects are kept within acceptable levels, additional mitigation would be implemented. On soils with a moderate-high or high compaction hazard rating, logging would be limited to the drier periods of the year, namely April through November. On soils with a severe compaction hazard rating, logging would be limited to a July through November operating season. Stands requiring limited operating seasons are listed in Chapter 2, technical requirements. Even during these drier periods, extra care would be taken to monitor soil conditions and suspend operations when soils become wet. Given this mitigation, soil compaction would be limited and is not expected to impair soil productivity.

Cumulative Effects

Effects from past actions are no longer impacting the soil resource. Ongoing and present actions impacting the soil resource would include planned prescribed burns. There is always the potential for a wind or insect/disease event that would result in salvage or sanitation harvests within the same areas proposed for harvest under this project. Because salvage or sanitation harvests in response to these natural events would also follow the Revised Forest Plan guidance designed to protect the soil resource, any additive effect would be minimal.

Water Resources & Quality

Present Condition

The project area boundary includes portions of five sixth-level watersheds (see table below) as defined by the National Hydrography Dataset (U.S. Geological Survey, 2004).

SIXTH-LEVEL WATERSHEDS IN PROJECT AREA (TABLE 3.3)

Name	12-digit Code	Watershed Area (acres)	Project Area (acres)	Project Area by Watershed
Broken Bow Lake Dam	111401080306	30623	2962	47%
Lick Creek-Mountain Fork	111401080307	28471	2103	34%
Yashau Creek	111401070405	20137	619	10%
Stephens Branch-Lukfata Creek	111401070403	20716	326	5%
Yanubbee Creek	111401070407	21903	248	4%

The Oklahoma Department of Environmental Quality periodically conducts an Integrated Water Quality Assessment as required by the U.S. EPA. The 2016 report is available online at http://www.deq.state.ok.us/wqdnew/305b_303d/. Comprehensive water quality data is collected by the Oklahoma Water Resources Board. Interactive Maps and GIS data for the project area are available at http://www.owrb.ok.gov/maps/index.php.

The Broken Bow Lake Dam Watershed encompasses almost 48 square miles and includes the southern half of Broken Bow Lake. Project activities within this watershed are within the Special Provision Area of the Upper Mountain Fork River from Broken Bow Dam including Broken Bow Reservoir to the 600-foot elevation level, as well as the ODEQ designated Source Water Protection Area. These areas protect the designated Sensitive Public and Private Water Supplies dependent upon Broken Bow Lake. Project activities within this watershed are located just upslope from the Hochatown State Park. Lakes and rivers in this watershed support or could potentially support a number of beneficial uses including Public and Private water supplies, Fish and Wildlife Propagation, Agriculture, Recreation, and Aesthetics. Broken Bow Lake is listed by the U.S. EPA on the 303(d) list of impaired waterbodies as Not Supporting Warm Water Aquatic Communities or Fish Consumption due to high levels of Cadmium derived from unknown sources. Specific restrictions due to the 303(d) listing are scheduled but are not currently in place.

The Lick Creek-Mountain Fork Watershed encompasses more than 44 square miles and is located generally between Broken Bow Dam and U.S. Highway 70 west of Eagletown. This watershed includes Beavers Bend State Park and the Ouachita Wildlife Management Area and closely follows the ODEQ Source Water Protection Area surrounding the Mountain Fork River south of Broken Bow Lake. This watershed is also entirely within the Special Provision Area of the Mountain Fork River upstream from U.S. Hwy. 70 Bridge to Broken Bow Dam, which is

itself part of the much larger Special Provision Area of the Little River from the Arkansas State Line to Pine Creek Dam which protects designated High Quality Waters of the state. Lakes and rivers in this watershed support or could potentially support a number of beneficial uses including Public and Private water supplies, Fish and Wildlife Propagation, Agriculture, Recreation, and Aesthetics.

The Yashau Creek Watershed encompasses more than 31 square miles and is a narrow watershed surrounding the North-South trending Yashau Creek. This watershed is part of the much larger Special Provision Area of the Little River from the Arkansas State Line to Pine Creek Dam which protects designated High Quality Waters of the state. Lakes and rivers in this watershed support or could potentially support a number of beneficial uses including Public and Private water supplies, Fish and Wildlife Propagation, Agriculture, Recreation, and Aesthetics. Yashau (or Yashoo) Creek is listed by the U.S. EPA on the 303(d) list of impaired waterbodies as Not Supporting Cool Water Aquatic Communities due to low macroinvertebrate populations. Potential sources of the impairment include drought-related impacts. No source of impairment has been identified and further study is required before any restrictions are established.

Stephens Branch-Lukfata Creek Watershed encompasses more than 32 square miles and includes the headwaters of Lukfata Creek. This watershed is part of the much larger Special Provision Area of the Little River from the Arkansas State Line to Pine Creek Dam which protects designated High Quality Waters of the state. Lakes and rivers in this watershed support or could potentially support a number of beneficial uses including Public and Private water supplies, Fish and Wildlife Propagation, Agriculture, Recreation, and Aesthetics. Lukfata Creek is listed by the U.S. EPA on the 303(d) list of impaired waterbodies as Not Supporting Cool Water Aquatic Communities or Primary Body Contact Recreation due to Enterococcus. A number of potential sources for the impairment have been identified including: grazing in riparian or shoreline zones, on-site treatment systems (septic systems and similar decentralized systems), rangeland grazing, residential districts, wastes from pets, wildlife other than waterfowl, or other unidentified sources. Specific restrictions due to the 303(d) listing are scheduled but are not currently in place.

The "High Quality Waters" and "Sensitive Public and Private Water Supplies" designations above are specific, special provisions included in Title 785, Chapter 45 of Oklahoma's water quality standards. These designations stipulate that no new point-source discharges of pollutants will be permitted within those watersheds without approval of the permitting authority. The actions proposed in this plan are all non-point sources of discharges, will be temporary in nature, and the magnitude of the discharges will be within the natural range of variability for forest ecosystems.

Effects Analysis

No Action

Direct and Indirect Effects

Under the No Action Alternative short-term water quality would remain unchanged or slightly improve. In the absence of timber harvest activities, yearly sediment yield from forested areas would likely remain in the range of 0.01 – 0.15 ton per acre (Dougherty, Srivastava, & Grace III,

2009) (Glasser, 1989) (Gianessi, Peskin, & Puffer, 1986) (Dissmeyer & Stump, 1978). In the absence of herbicide treatment, there would be no risk of herbicides impacting water quality from planned treatments.

Under the No Action Alternative, long-term water quality could be threatened due to an increased risk of large and high-severity fire events and the associated impacts to soils in the burned areas. High-severity fires can affect the soil structure and porosity (Fernandez, Cabaneiro, & Carballas, 1997), reducing its ability to absorb water and increasing its erodibility (Scott & Van Wyk, 1990). Severe fires also can increase pH levels and reduce soil nutrient levels (Certini, 2005). As a result, significant soil erosion, including the formation of large uplands gullies, increases sediment yield to nearby streams. Runoff water chemistry can be altered resulting in high pH and low or altered nutrient levels. The loss of vegetation following a high-severity fire results in decrease interception of precipitation, and reduced water storage and residence time in the uplands soils. Runoff with large sediment yield is delivered quickly to nearby streams leading to flashy flow behavior, increasing the likelihood of flooding, stream channel incision, bank failure, and downstream avulsions (Moody & Martin, 2001). All sediment delivered to streams is ultimately deposited downstream in large basins including reservoirs such as Broken Bow Lake reducing their storage capacity and service life. Following high-severity fires, sediment yield can return to pre-fire levels in one to five years, but impacts such as altered stream-channel morphology, uplands gullies, and reduced downstream reservoir capacity may persist indefinitely.

Proposed Action

Direct and Indirect Effects

Direct effects of manual timber management activities would result from logging equipment and vehicles traversing stream crossings, fireline and road construction through and adjacent to streams, etc. These activities could place sediment or pollutants (such as petro-chemical leaks) directly into a stream. While it is impractical to eliminate all soil from entering a stream, it is possible to limit the amount that directly enters streams by designing and implementing BMPs. The Revised Forest Plan and other Forest Service BMP guidance (USDA Forest Service, 2012) adopt BMP criteria that meets or exceeds the recommendations provided in Oklahoma's Best Management Practices for Water Quality (Oklahoma Forestry Services, 2016). When herbicides are transported, mixed, and applied, there is a risk that the herbicide could be spilled. Herbicides may enter streams, ponds, and lakes during treatment by non-permitted direct application or incidental drift.

Indirect effects to water quality are those occurring at a later time or distance from the triggering management activity. Indirect effects are from management activities that do not have a direct connection to a stream course.

Timber harvest and fire can increase nutrients released to streams, with potentially positive or negative effects. Research studies in the Ouachita Mountains have shown increases in concentrations of some nutrients following timber harvest, but increases are generally small and short-lived, particularly where partial harvests are implemented (Oklahoma Cooperative

Extension Service, 1994). Small increases in nutrient concentrations may have a beneficial effect on these typically nutrient-poor stream systems. Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed fire lines accounted for the majority of sediment from all watersheds.

Road maintenance and/or construction, fireline construction and reconstruction and timber management activities such as construction of skid trails, temporary roads and log landings could result in increases in erosion and sedimentation. Roads contribute more sediment to streams than any other land management practice (Lugo & Gucinski, 2000). The proposed action calls for fuel breaks to be constructed with a 15-foot-wide area with complete mid- and over-story removal, surrounded by areas thinned to a target basal area. The 15-foot fuel break would be susceptible to increased erosion due to a decrease in vegetative interception of precipitation and a decrease in root structure and an increase in bare soil area.

Increases in water yield are generally proportional to decreases in vegetative cover. Because vegetative cover would to some extent decrease, water yield increases are expected to be short term and minor since new growth will quickly reestablish (Oklahoma Cooperative Extension Service, 1994). Stream channels in the area are capable of withstanding small increases in flow.

Stream-side management areas (SMAs) will be established according to the specifications in the Revised Forest Plan. SMAs preclude timber harvest immediately adjacent to the stream channels and place limits on other management activities. Forest monitoring has demonstrated that indirect effects from vegetation manipulation from harvest or stand improvement with SMAs did not have a significant effect on water quality (Clingenpeel, 1989). Beasley et al. (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there was no meaningful impact to water quality.

The Proposed Action includes the use of the herbicides triclopyr, imazapyr, imazapic, and glyphosate for site preparation and release, and midstory reduction. When herbicides are applied, there is a risk that the chemical could move offsite, possibly entering streams, ponds, lakes, or infiltrate ground water by vertical seepage into aquifers. The Forest Service has specific regulations for the use and application of herbicides, and the Ouachita NF adheres to additional design criteria for herbicide application in the Revised Forest Plan. When all BMPs or regulations are implemented, there should be little movement of herbicide offsite. The introduction of herbicides into the water is treated as an indirect effect since standards and guidelines (BMPs) do not permit direct application onto aquatic systems for silvicultural purposes. Herbicide monitoring across the Forest has found that only trace amounts of herbicide have ever been detected in streams (Clingenpeel, 1993).

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. The application of triclopyr for site preparation and release was included in the analysis. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a meaningful threat to beneficial uses. The Ouachita continues to incorporate a variety of monitoring techniques including post-application water quality sampling and off-site mortality and non-target species mortality. Detection of herbicides in water samples are infrequent and near the detection limits for the methods employed. No significant aquatic contamination has been detected. Based on this evaluation, the BMPs used in the transportation, mixing, application and disposal are effective at protecting beneficial uses. Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely.

No Herbicide Use

Direct and Indirect Effects

The effects of management activities for all mechanical treatment techniques would be the same as those described in the Proposed Action. Substituting mechanical treatments for the chemical treatments described above in the Proposed Action for site preparation, release, precommercial thin, and midstory removal would result in similar to slightly higher impacts than the No Action Alternative. In this alternative, individuals on foot or vehicles will access stands to mechanically inhibit the growth of the understory. Mechanical treatments, such as ripping, and the net reduction of vegetation would result in increases in erodible sediment that could be transported to the stream network. The residual dry mass will be left in place and effectively capture and retain sediment on the uplands and rapid regrowth of the understory will reduce erosion to baseline conditions within one to two years. There would be no incidental contamination of water bodies due to drift and no chance of herbicide spills from activities permitted under this alternative.

Uneven Aged Management

Direct and Indirect Effects

Impacts due to the uneven aged management of stands would be similar in magnitude to the effects described above. Any distinction would be the source and timing of the impacts. Uneven aged stand management would result in many small recently harvested areas as opposed to a few larger areas. This would likely result in similar sediment yields from harvested areas. Depending on the logistical considerations, the transportation network, i.e. roads, would be in constant use as log trucks and harvesting equipment moved from location to location. This is contrasted with the proposed activity were many roads would be unused for some years between management activities and could become partially revegetated resulting in less sediment production.

Shaded Fuel Breaks

Direct and Indirect Effects

Most effects for this alternative would be similar to those described above. The design for shaded fuel breaks calls for a 30-foot-wide area with complete mid- and over-story removal compared to 15 foot in the proposed alternative. The 30-foot fuel break would be susceptible to increased erosion due to a decrease in vegetative interception of precipitation and a decrease in root structure and an increase in bare soil area.

Cumulative Effects All Alternatives

The Aquatic Cumulative Effects (ACE) model was used to identify the watershed condition of the 12-digit Hydrological Unit Code (HUC) sixth-level subwatersheds, as well as assess proposed project impacts. Watershed Condition Rank (WCR) is a measure integrated in the model that returns a High, Moderate, or Low risk level based on predicted sediment delivery to streams, and effects on fish community diversity and abundance. The primary variables driving ACE, and subsequently the WCR, are road density, urban areas, pasture lands and project treatments.

Local research has shown that the effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Beasley, Miller, & Lawson, 1987). The timeframe of this model is bound by three years prior and one year following implementation. This captures the effects of other management activities that may still affect the project area. This is consistent with most project level environmental analyses that have an operability of five years. Proposed actions are constrained to a single year. This expresses the maximum possible effect that could occur. Past activities that have a lasting effect (such as roads and changes in land use) are captured by modeling the sediment increase from an undisturbed condition. The predicted sediment delivery and risk levels for the subwatersheds are displayed in the table below.

SEDIMENT DELIVERY BY ALTERNATIVE (TABLE 3.4)

Subwatershed *12-digit HUC ID*	**Alternative**	**Sediment Delivery**		**Risk Level**
		Additional Tons Per Year	**% Increase***	
Broken Bow Lake Dam *111401080306*	*Current Condition*		258	Low
	No Action	107	266	Low
	Proposed Action & No Herbicide	734	309	Low
	Uneven Aged Management	616	301	Low
	Shaded Fuel Breaks	788	313	Low
Lick Creek-Mountain Fork *111401080307*	*Current Condition*		758	Low
	No Action	218	799	Low
	Proposed Action & No Herbicide	723	894	Low
	Uneven Aged Management	685	887	Low
	Shaded Fuel Breaks	783	906	Low

Subwatershed *12-digit HUC ID*	**Alternative**	**Sediment Delivery**		**Risk Level**
		Additional Tons Per Year	**% Increase***	
Yashau Creek *111401070405*	*Current Condition*		5,862	Moderate
	No Action	202	6,056	Moderate
	Proposed Action & No Herbicide	465	6,306	Moderate
	Uneven Aged Management	436	6,279	Moderate
	Shaded Fuel Breaks	542	6,380	Moderate
Stephens Branch-Lukfata Creek *111401070403*	*Current Condition*		2,431	Low
	No Action	257	2,564	Low
	Proposed Action & No Herbicide	302	2,587	Low
	Uneven Aged Management	302	2,587	Low
	Shaded Fuel Breaks	314	2,593	Low
Yanubbee Creek-Crooked Creek *111401070407*	*Current Condition*		6,348	Moderate
	No Action	252	6,680	Moderate
	Proposed Action & No Herbicide	306	6,750	Moderate
	Uneven Aged Management	306	6,750	Moderate
	Shaded Fuel Breaks	321	6,770	Moderate

*Percent increase over sediment delivery from undisturbed watershed condition

Broken Bow Lake Dam, Lick Creek-Mountain Fork, and Stephens Branch-Lukfata Creek Subwatersheds

For all alternatives, the risk level to beneficial uses would remain low. There would be no risk that effects would rise to a level threatening violation of any water quality standard or administrative limit. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses (USDA Forest Service, 2015).

Yashau Creek and Yanubbee Creek-Crooked Creek Subwatersheds

For all alternatives, the risk level to beneficial uses would remain moderate. Environmental effects are measurable and observable for short periods of time following storm events. These effects are short term (less than a few weeks) and do not affect large portions of the watershed. Recovery is complete and beneficial uses are disrupted only for short periods in localized areas (USDA Forest Service, 2015).

Transportation & Infrastructure

Present Conditions

Roads within the project area are used for a variety of purposes, including access to Beavers Bend State Park, vehicle touring, and hunting access. NFS Road 52800 comprises the project area to the north, Oklahoma State Highway South 259A bounds the project area to the south, and US Highway259 makes up the western boundary. Golf Course Road, Carson Creek Road, Stephens Gap Road, OK North 259A, and NFS Roads 50860, 52680, 52800 provides primary access to the interior of the project area.

There are approximately 22.85 miles of National Forest System roads (NFSR) in the project area; about 18.19 miles are closed (administrative use). There are also 2.87 miles of paved roads open to the public with county jurisdiction. The current Motor Vehicle Use Map (MVUM) designates:
NFSRs as follows: 1.89 miles open to highway legal vehicles only, yearlong; 0 miles open to highway legal vehicles only, seasonally; 0 miles open to all vehicles, yearlong; 2.77 miles open to highway legal vehicles yearlong/OHVs seasonally; and 0 miles open seasonally to all vehicles.

Motorized mixed use occurs when a NFSR is designated for use by both highway-legal and non-highway-legal motor vehicles (FSM 7705). Motorized mixed use is allowed on 4.66 miles of roads within the project area. There are no designated motorized (OHV) trails.

For wildlife purposes, the Revised Forest Plan provides ORD objectives by MA (OBJ05, p. 59). The following table displays calculated ORDs for the project and the objective for each MA.

OPEN ROAD DENSITY BY MA (TABLE 3.5)

Management Area	Open Road Density (mi/mi^2)		
	Objective	Project (All Roads)	Project (NFS Roads)
16	0.75	0.77	0.48

Effects Analysis

No Action

Direct, Indirect and Cumulative Effects

No activities are proposed, therefore there would be no direct, indirect or cumulative effects to access or to ORD.

All Action Alternatives

Direct and Indirect Effects

Temporary roads would be obliterated after management activities are completed.
System road reconstruction would improve conditions sufficient to support management activities and restore routes to their original design function.

Changes to motor vehicle use route designations published on the MVUM would result in no change in miles of closed road opened to public use, and no change in miles of open road closed to public use.

There would be no change in ORD.

Cumulative Effects

There are no other past, present or reasonably foreseeable changes to the transportation system that would result in additional effects.

Vegetation

Present Conditions

The project area contains approximately 6,260 acres, of which, 6,260 acres are NFS lands; 6,218 acres are considered suitable (for timber production) lands. The District Office for the Oklahoma Ranger Districts sits on a 42 acre admin site that is unsuitable for timber production. This stand will be harvested to emulate natural processes, but is not intended to be managed for timber production. Much of the land in this project area has steep, rocky terrain, and will be left untreated with timber harvests. The land with these conditions is considered suitable, but will have pockets of unsuitable due to streamside management zones, steepness exceeding 35%, or areas of sparse timber due to low soil productivity. These are not identified through management units, but will be identified and protected during implementation. The project area includes Compartments 1841, 1842, and 1877. Pine-hardwood stands dominate the suitable lands in the project area:

- Pine forest = **485** acres.
- Pine hardwood forest = **5144** acres.
- Hardwood pine forest = **44** acres.
- Hardwood forest = **586** acres.

Age classes range from 5 years old to 101+ years of age with the majority, 50%, falling into 71-90 years. 74% of the area is over 70 years of age, and there is currently 13 silviculturally-managed acres of 10 years or less. These 13 acres are a wildfire scar that burned in 2014 and was reseeded with shortleaf pine the following year. There are 4,285 acres of mature pine and pine/hardwood forest types (70+ years), while the mature hardwood and hardwood/pine types account for 235 acres (100+ years). The following table illustrates age class distributions on suitable and unsuitable lands.

FOREST TYPE BY AGE CLASS ALL FORESTED LAND (TABLE 3.6)

Age Class (years)		Forest Type[1] (acres)				Total	
		Pine	Pine-Hardwood	Hardwood-Pine	Hardwood	Acres	Percent
0-10		0	13	0	0	13	<1
11−20		0	0	0	0	0	0
21−30		0	0	0	0	0	0
31−40		336	18	0	18	372	6
41−50		117	0	0	10	127	2
51−60		32	405	0	109	546	9
61−70		0	423	27	71	521	8
71−80		0	1632	0	64	1696	27
81-90		0	1442	17	12	1471	23
91-100		0	585	0	67	652	10
101+		0	626	0	235	861	14
Total	**Acres**	485	5144	44	586	**6260**	
	%	8	82	1	9		**100**

1 – Pine: At least 70% of the dominant and co-dominant crowns are softwoods.
Pine-Hardwood: 51-69% of the dominant and co-dominant crowns are softwoods.
Hardwood-Pine: 51-69% of the dominant and co-dominant crowns are hardwoods.
Hardwood: At least 70% of the dominant and co-dominant crowns are hardwoods.

The weighted average of basal area per acre is 88 ft^2/ac. This includes suitable and unsuitable acres.

No Action

Direct, Indirect and Cumulative Effects

There would be no direct effects on forest health and stand vigor. Proposed actions resulting in early seral habitat creation would not occur. In the absence of fire or other vegetation management activity, trees would grow in and grow up and shade out shrubs, forbs and grasses and reduce their quantities. In the absence of management activities such as thinning and regeneration harvests, forest health would be at risk due to increased potential for pest infestations such as the southern pine beetle. Over time, with no implementation of vegetation management, the amount of trees would increase, and forest health and stand vigor would continue to decline.

In the absence of natural disturbance, through time the current age classes would retain the same distribution in relation to one another, but the distribution would be increasingly skewed to the older age classes. The forest would continue to age, moving more pine and hardwood acreage into mature growth.

Proposed Action

Direct and Indirect Effects

The amount of early seral habitat within suitable acres would increase from 13 acres (<1%) to approximately 537 acres (9%) through seedtree regeneration harvests(481 acres) and clearcut regeneration harvests(56 acres). These seedtree regeneration harvest acres would be reforested through natural regeneration and maintained in early seral habitat for roughly 15 years, depending upon success of natural regeneration. The clearcut regeneration harvest acres are currently occupied by a plantation of off-site loblolly, all existing pines will be harvested from the site while hardwoods are maintained. The site will be prepared for planting by applying herbicides to or mechanical removal of the understory and competing vegetation, will then be planted with containerized shortleaf pine, and then be released as necessary from competing vegetation to successfully re-establish a forested stand.

On 664 acres of pine and pine-hardwood forest, an uneven-aged management strategy would be implemented through group-selections. This would result in regeneration gaps in the forest that range from ½ acre to 2 acres in size, spread out across the stands. These openings would then be prepared through either chemical or mechanical means and then regenerated naturally from mature trees surrounding the openings. This allows site specific genetics to remain on site while allowing to maintain older, mature trees, and begin acquiring younger age classes. These activities, while allowing a more sustained flow of forest products over time, will also allow a more diverse amount of forest habitat types over smaller areas. The areas in these uneven-aged management stands surrounding the gaps will be thinned to improve overall tree vigor and health within the stands.

Diseased, damaged and suppressed trees would be removed through commercial thinning (intermediate harvest) on approximately 4,564 acres of pine forest, pine-hardwood forest, and hardwood-pine forest. By reducing stand densities through thinning, individual tree health and vigor would be improved, therefore improving overall stand vigor. This in turn would increase stand resilience to future changes and disturbances, including forest insects, disease, climate change, or other events.

Existing mature growth pine and pine-hardwood habitat (70 years old or greater) would be reduced through even-aged regeneration harvests from 68% to 60% of the acreage in pine and pine-hardwood stands. The percentage of mature growth hardwood habitat (100 years old or greater) would not change.

During the regeneration of pine stands, the hardwood sprout/seedling component objective is 10 to 30 percent of stems in hardwoods, primarily oaks and hickories (Revised Forest Plan, FR003, p. 80). Hardwoods would be removed in pine regeneration harvest areas through subsequent seedling release treatments, however a minimum of 10 percent hardwood would be retained or maintained through the life of the stand where possible. Hardwood trees with a diameter at breast height of 5” or greater would be maintained through these release treatments. Recruitment of hardwoods within these stands could also be impeded by these activities.

Construction of permanent fuels breaks totaling 45 feet along the interface of NFS land and private land would contribute to the amount of early seral habitat, and would be maintained as such indefinitely. With 15 feet of complete over- and mid-story removal and 30 feet of reduced residual basal area, the linear nature of these areas would contribute, but minimally, to the early seral objectives. This proposed action would result in 106 acres of early seral habitat (1.7% of the project area). These areas would be considered as inclusions within existing stands and tracked with the existing stand surrounding the fuels break.

Along existing roadways, overstory and mid story vegetation will be removed to increase defensible space for public and firefighter safety during response to wildfire events and prescribed burn efforts. Within the first 15 foot from the edge of the road, all over-story and mid-story vegetation will be removed, these areas shall be maintained for prescribed fire and wildfire suppression. Within the second 15 feet (for a total of 30 feet) will reduce the over-story and mid-story vegetation to a desired basal area of 40-50 ft^2/ac. These fuel break areas will be maintained in early seral grass-shrub habitat indefinitely resulting in an additional 196 acres (3.1% of the project area). In most areas, these acres are already maintained in early seral habitat through existing road maintenance easements.

Proposed even-aged management harvests, combined with proposed fuel treatments along roads and fireline construction and fuelbreak activities, would result in 839 acres of early seral habitat creation, or 13.5% of the suitable acres.

Cumulative Effects

Approximately 384 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The effects of commercial thinning of vegetation as described above would be additive to these authorized activities.

No Herbicide Use

The effects of this alternative would be the same as those listed under the Proposed Action except only manual or mechanical methods would be used in vegetation management activities. Site preparation and release activities would be less successful, making stand establishment more difficult, resulting in additional entries into the stand and higher costs to accomplish planned goals.

Uneven Aged Management

Direct and Indirect Effects

The amount of early seral habitat within suitable acres would increase from 13 acres (<1%) to approximately 69 acres (1%) through a clearcut regeneration harvests. These additional 56 acres would be mechanically or chemically site prepped and planted with shortleaf pine to re-establish the native pine species on the site. The 56 acres would be maintained in early seral stage for approximately 15 years, depending on success of regeneration efforts.

Diseased, damaged and suppressed trees would be removed through commercial thinning (intermediate harvest) on approximately 2,654 acres of pine forest, pine-hardwood forest, and hardwood-pine forest. By reducing stand densities through thinning, individual tree health and vigor would be improved, therefore improving overall stand vigor. This in turn would increase stand resilience to future changes and disturbances, including forest insects, disease, climate change, or other events.

On 3,057 acres of pine and pine-hardwood forest, an uneven-aged management strategy would be implemented through group-selections. This would result in regeneration gaps in the forest that range from ½ acre to 2 acres in size, spread out across the stands. These openings would then be prepared through either chemical or mechanical means and then regenerated naturally from mature trees surrounding the openings. This allows site specific genetics to remain on site while allowing to maintain older, mature trees, and begin acquiring younger age classes. These activities, while allowing a more sustained flow of forest products over time, will also allow a more diverse amount of forest habitat types over smaller areas. The areas in these uneven-aged management stands surrounding the gaps will be thinned to improve overall tree vigor and health within the stands.

Existing mature growth pine and pine-hardwood habitat (70 years old or greater) would not be reduced through even-aged regeneration harvests and woodland development from 68% of the acreage in pine and pine-hardwood stands. The percentage of mature growth hardwood habitat (100 years old or greater) would not change.

During the regeneration of pine and pine-hardwood stands, the hardwood sprout/seedling component objective is 10 to 30 percent of stems in hardwoods, primarily oaks and hickories (Revised Forest Plan, FR003, p. 80). Hardwoods would be removed in pine regeneration harvest areas through subsequent seedling release treatments, however a minimum of 10 percent hardwood would be retained or maintained through the life of the stand where possible. Recruitment of hardwoods within these stands could also be impeded by these activities.

Vegetation removal along roads and creation of fuel breaks and firelines would be the same as the proposed action, resulting in 302 acres of early seral habitat. Combined with the proposed even-aged regeneration clearcut harvest (56 acres), a total of 358 acres, or 5.9% of early seral habitat would be created from suitable acres.

Cumulative Effects

Approximately 384 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The effects of commercial thinning of vegetation as described above would be additive to these authorized activities.

Shaded Fuels Breaks

Direct and Indirect Effects

The effects of this alternative would be the same as those listed under the Proposed Action except the amount of early seral habitat created would be greater due to the wider fuelbreak and fireline of 150 feet compared to 45 feet. This larger fuelbreak would result in creation of 352 acres of early seral habitat. When combined with the vegetation removal along roads (196 acres), and the proposed even-aged regeneration harvests (537 acres), this alternative would create a total of 1,085 acres of early seral habitat, or 17% of the suitable acres.

Construction of these permanent fuels breaks totaling 150 feet in width along the interface of NFS land and private land would be maintained as such indefinitely (see Chapter 2 for detailed description). These areas would be considered as inclusions within existing stands and tracked with the existing stand surrounding the fuels break.

Cumulative Effects

The cumulative effects of this alternative would be the same as the Proposed Action.

Fuels and Wildfire Impacts

Present Conditions

The existing conditions for fire and fuels within the Hochatown WUI project area (6,260ac) is a Fire Regime 1 Condition Class 3 with a High probability for High Intensity/ High Severity wildfire. This is due to past fire suppression activities, where the natural role of fire has been removed from the landscape. Identifying Fire and Fuel existing conditions is determining Fuel Model (Fuel Model represents vegetation structure) and Fuel Type (Fuel type represents specific vegetation). Existing Fuel Models within the project area are Fuel Model-2 Timber (grass & Understory) & FM9- Hardwood Litter (Anderson, 1982).

Existing Fuel types are Shortleaf Pine/Oak; Loblolly Pine Regen; Hardwood leaf litter. Available dead and down fuels measured in tons/per acre average from (2.7-T/pa Low to 5.1-T/pa High); from (USDA Forest Service, 2005c). These conditions reflect the probable fire behavior which corresponds to the expected Intensity and Severity of the existing conditions within the project area when planned or unplanned fire occurs. As part of Fire Regime the Mean Fire Return Interval gives us period (years) between fire occurrence under presumed historical fire regime. Condition Class is the composite estimate of vegetation characteristics- species; structure; age; canopy closure; and fuel composition**.** Areas of steep, rocky terrain will limit the use of heavy equipment.

No Action

Direct, Indirect and Cumulative Effects

There would be no direct effects associated with this action. Fuel Treatments & Fire-line construction would not occur limiting the probability of success for responding resources to an unplanned event (wildfire). Additionally under this action there would continue to be limits to responders decision space, in determining the most Appropriate Management Response (AMR); Not providing an anchor point for which suppression actions can be based; No buffer devoid of over-story, mid-story vegetation and large woody fuels, thus promoting the potential for active and passive crown fire; Limited access to areas where wildfire may occur; No reduction potential for wildfires to spread from forest to private ownership and private ownership to forest; Decreases the amount of time needed for potential evacuations of residences; especially in areas where road access is limited to only one way in and one way out; No perimeter from which prescribed fire may be implemented.

Proposed Action

Direct and Indirect Effects

With this action Public and Responder safety can be improved by creating fuel breaks/ fire lines. This can be accomplished by following the National Cohesive Wildfire Strategy goals/objectives for areas at risk of wildfire, within the Wildland Urban Interface.

Implementing the National Cohesive Wildfire Strategy goals/objectives is intended to prepare communities for when a wildfire occurs.

Fuel Reduction ~ Over-story, by increasing canopy spacing the risk for active and passive crown fire is reduced; Mid-story, by reducing mid-story the risk of ladder fuels contributing to active and passive crown fire is reduced; Reduces the Rate of Spread (ROS), Flame Length (FL) and Fire line intensity (FI); Reduces intensity and severity of remaining vegetation when wildfire occurs. Proposal is reduce vegetation to 40-50 basal area.

Fire-lines ~ Allows responders more decision space, while determining the most Appropriate Management Response (AMR); Provides an anchor point for which suppression actions can based; Provides a buffer devoid of over-story, mid-story vegetation and large woody fuels; Allows better access to areas where wildfire may occur; Reduces potential for wildfires to spread from forest to private ownership and private ownership to forest; Increases the amount of time needed for potential evacuations of residences; especially in areas where road access is limited to only one way in and one way out; Provides a perimeter from which prescribed fire may implemented.

In the event of a wildfire, fire-line construction and fuelbreak creation (19.35 miles) and mechanical removal of vegetation along the roads (196 acres) would increase and provide additional suppression space for responders and increase visibility for the public and responders during evacuation and/or deployment of people and equipment.

No Herbicide Use and Uneven Aged Management

The effects of these alternatives would be the same as those listed under the Proposed Action.

Shaded Fuels Breaks

Direct and Indirect Effects

This alternative is similar to the proposed action, but would allow for greater fireline width and greater fuels treatment depth. This would increase and provide additional suppression space for responders and increase visibility for the public. The specific variations are in width and depth. This treatment would allow for greater width (30ft) fireline be constructed and a greater depth (120ft) fuels treatment. The first (100ft) of fuels treatment would follow the private and forest boundary serving as a buffer similar to the proposed action (increased from 30ft to 100ft). The (30ft) fireline construction is also similar to the proposed action but again would be (15ft) greater in width (increased from 15ft to 30ft). An additional (20ft) fuels treatment would increase the total treated area to (150ft). These treatments could potentially increase the desired effects of reducing active or passive crown fire and limited fire spread, more than the proposed action. This treatment would meet the goals/objectives identified by the National Cohesive Wildfire Strategy as stated above in the proposed action.

Cumulative Effects All Action Alternatives

Approximately 384 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The effects on fuels and wildlire impacts from this project would be additive to the effects from these authorized activities.

Effects on Migratory Bird Species

The pileated woodpecker, scarlet tanager, and prairie warbler are representative migratory bird species within the project area and are some of the 1,026 species listed under the Migratory Bird Treaty Act. Effects on these species and their habitat are disclosed in the following Management Indicator Species (MIS) section.

Management Indicator Species and Habitat (MIS)

As part of the overall effort to ensure that habitat requirements of all native vertebrates, invertebrates, and plants are considered in the planning, implementation, and monitoring of Forest management practices, the Revised Forest Plan lists 25 species that should adequately address the effects of Forest management practices on fish and wildlife populations and their habitat needs, as well as demand species and species of special interest. These 25 species, termed “Management Indicator Species” (MIS), represent a broad array of habitats covering diverse geographic areas within the ONF, as well as inhabiting areas with diverse management objectives.

MIS Selected for This Project: The entire list of 25 MIS was reviewed and a subset was selected as MIS for the actions proposed in this EA. The MIS selected include six terrestrial species and seven fish species. Species not known to occur within the action area, lacking suitable habitat, or not tied to an appropriate evaluation objective were not selected, as indicated in the far right column of the following table.

POTENTIALLY AFFECTED MANAGEMENT INDICATOR SPECIES (TABLE 3.7)

Life Form	Common Name	Scientific Name	Selected as MIS for this project? (Yes/No)
Bird	Northern bobwhite	*Colinus virginianus*	Yes
Mammal	White-tailed deer	*Odocoileus virginianus*	Yes
Bird	Eastern wild turkey	*Meleagris gallapavo*	Yes
Bird	Red-cockaded woodpecker	*Picoides borealis*	No
Bird	Pileated woodpecker	*Dryocopus pileatus*	Yes
Bird	Scarlet tanager	*Piranga olivacea*	Yes
Bird	Prairie Warbler	*Dendroica discolor*	Yes
Ponds, Lakes, and Waterholes			
Fish	Bluegill	*Lepomis macrochirus*	No
Fish	Redear sunfish	*Lepomis microlophus*	No
Fish	Largemouth bass	*Micropterus salmoides*	No
Arkansas River Valley Streams			
Fish	Yellow bullhead	*Ameiurus natalis*	No
Fish	Central stoneroller	*Campostoma anomalum*	No
Fish	Redfin darter	*Etheostoma whipplei*	No
Fish	Green sunfish	*Lepomis cyanellus*	No
Fish	Longear sunfish	*Lepomis megalotis*	No
Gulf Coastal Plain Ecoregion Streams			
Fish	Pirate perch	*Aphredoderus sayanus*	No
Fish	Central stoneroller	*Campostoma anomalum*	No
Fish	Creek chubsucker	*Erimyzon oblongus*	No
Fish	Green sunfish	*Lepomis cyanellus*	No
Fish	Longear sunfish	*Lepomis megalotis*	No
Ouachita Mountain Ecoregion Streams			
Fish	Central stoneroller	*Campostoma anomalum*	No
Fish	Highland stoneroller	*Campostoma spadiceum*	Yes
Fish	Johnny darter*	*Etheostoma nigrum*	No
Fish	Orangebelly darter	*Etheostoma radiosum*	Yes
Fish	Redfin darter	*Etheostoma whipplei*	Yes
Fish	Northen studfish	*Fundulus catenatus*	No
Fish	Northern hog sucker	*Hypentilium nigricans*	No
Fish	Green sunfish	*Lepomis cyanellus*	Yes
Fish	Longear sunfish	*Lepomis megalotis*	Yes
Fish	Striped shiner	*Luxilus chrysocephalus*	Yes
Fish	Smallmouth bass	*Micropterus dolomieui*	Yes
Fish	Channel darter*	*Percina copelandi*	No

*Glover and Upper Mountain Fork River watersheds only

Terrestrial MIS

TERRESTRIAL MIS AND ASSOCIATED PURPOSES (TABLE 3.8)

Life Form	Common Name	Scientific Name	Primary Reason for Selection
Mammal	White-tailed deer	*Odocoileus virginianus*	To help indicate effects of management on meeting public hunting demand
Bird	Northern Bobwhite	*Colinus virginianus*	To help indicate effects of management on meeting public hunting demand, to aid in current and future condition of early seral habitat, and to help indicate effects of management on the pine-oak woodland community
Bird	Prairie Warbler	*Dendroica discolor*	To help indicate effects of management on the early successional component of forest communities
Bird	Eastern Wild Turkey	*Meleagris gallopavo*	To help indicate effects of management on meeting public hunting demand
Bird	Pileated Woodpecker	*Dryocopus pileatus*	To help indicate effects of management on snags and snag-dependent species
Bird	Scarlet Tanager	*Piranga olivacea*	To help indicate effects of management on mature forest communities

White-tailed Deer

White-tailed deer was selected as an MIS species based on its big game status, and because its population levels can be evaluated along with habitat trends (USDA Forest Service, 2005b). This opportunistic herbivore has a diet that includes annual and perennial forbs, fruits, hard mast, grasses, flowers and fungi. Food utilization studies of deer in the southern U.S. show that use of woody twigs, even in winter, is insignificant (Miller K. , 2001). The quality and quantity of forage (grasses and herbaceous vegetation) have the greatest impacts on whitetail populations. The Ouachita Mountains are considered sub-optimal habitat for deer due to reduced soil fertility and productivity, particularly the level of soil phosphorus that is a useful predictor of potential physiological condition (Miller K. , 2001).

Population Trends (USDA FS, 2017)

The estimated habitat capability for deer is slightly above the range of the desired habitat capability of 38,105 acres for 2017. Habitat carrying capacity is calculated using acres within the Ouachita National Forest. Habitat carrying capacity is positively influenced by the number of acres of prescribed fire accomplished and early seral habitat created, including regeneration, thinning, mid-story removal, wildlife stand improvement, wildlife openings, and site preparation, but negatively influenced by timber stand improvement (short-term).

The Final Environmental Impact Statement for the Forest Plan (USDA Forest Service, 2005b) indicated in Table 3.59 (p166) a desired terrestrial habitat capability to support an average of 13.7 deer per square mile within the Ouachita NF after 10 years. This was calculated on a land base of 1,789,320 acres (2,796 square miles) for a habitat capability that would support 38,303 deer. The habitat capability as estimated by the CompPATS wildlife model exceeds the Forest Plan projections for every year in the period 2006 – 2017, with the exception of 2016. CompPATS was not calculated for 2015. For 2017, the Forest Plan projected 38,303 deer and the CompPATS model indicates 38,640 individuals, a difference of less than 400 individuals and only 1 percent greater than the Forest Plan calculation.

Deer are widespread, abundant, and their habitat capability is just above the Forest Plan projection. There are no indications of a need for adjustment in current management practices.

Direct and Indirect Effects

No Action

There would be no direct effects to the white-tailed deer through implementation of the no action alternative.

However, indirect effects would occur to this MIS. Under this alternative, there would not be any increase in habitat quality and forage production. The stands would be allowed to continue towards maturity, which would provide increased canopy closure. The canopy closure would continue to block out sunlight, and the stands would move towards decreased food production. Over the long-term, these stands would provide decreased production of grasses, forbs, and legumes, which are the most important food items and habitat components for white-tailed deer. Unmanaged stands do not provide as much wildlife food production as managed stands (Masters & Wilson, 1994). This is due to the closed canopy condition created by allowing reduced sunlight to reach the forest floor and allowing the forest to mature to a climax community.

The No Action Alternative would be expected to provide neutral to somewhat negative effects on the forest-wide trend for white-tailed deer because the habitat quality would not be improved above its present conditions and would be decreased over time due to lack of increased foraging opportunities. Succession would continue in all forest types, with habitat becoming more homogeneous and less diverse.

Proposed Action

The proposed action would be expected to provide a positive effect on the forest-wide trend for white-tailed deer because the proposed action would provide improved habitat quality through forest vegetation manipulation.

No direct effects would occur through implementation of the proposed action. Deer may be temporarily displaced from areas during resource management activities, but they are mobile animals and would be able to escape harm from any of the proposed management activities.

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

Positive indirect effects would be expected to occur to white-tailed deer through the proposed timber, silvicultural, and vegetation management activities. White-tailed deer are habitat generalists and can use several habitat types including early seral stage, mid-successional stage, mature pine, and mature hardwood areas. Forest management can influence the quality of the available habitat. The reduction in tree density and associated increase in sunlight reaching the forest floor would result in improved habitat conditions for herbaceous food and cover plants benefiting deer (Fenwood, Urbston, & Harlow, 1984). These previously described food items are more important than browse (twigs, shoots, and leaves of shrubs, trees and vines) which constitutes only a moderate portion of a deer's diet (Miller K. , 2001). The response of herbaceous forage species to harvest, in declining order by method, would be clearcut, seedtree, and commercial thinning. A good mix of these harvest methods would provide excellent deer habitat. Timber harvest, midstory reduction, and associated activities increase white-tailed deer forage production by increasing the growth of grasses, forbs, legumes, composites, and other herbaceous and grass species (Hodgkins, 1958) (Halls & Boyd, 1982) (Masters, Engle, & Robinson, Effects of Timber harvest and Periodic Fire on Soil chemical Properties in the Ouachita Mountains., 1993) (Masters & Wilson, 1994) (Masters, Bidwell, & Shaw, undated) (Masters, Warde, & Lochmiller, 1997) (Weir & Greis, 2002) (USDA Forest Service, 2000).

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

No direct effects would occur to white-tailed deer. The proposed construction of approximately 5.02 miles of roads, 19.35 miles of firelines, and 195.92 acres of fuel breaks would provide incidental positive benefits to the white-tailed deer by providing approximately 232 additional acres of open habitat producing grasses, forbs, and herbaceous plants important to deer foraging. These areas also provide additional edge habitat, travel ways, escape routes, and bedding sites. However, the increased food production and habitat quality is negligible compared to the amount of food and quality of habitat produced through timber management and associated activities.

Wildlife Pond Construction

No direct effects would occur to white-tailed deer. Positive indirect effects would be expected from the proposed waterhole construction because these areas would serve as year-round water sources for white-tailed deer.

Bluebird Nestboxes

There would be no direct or indirect effects on white-tailed deer from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Use of herbicide in silvicultural and wildlife treatments involves low concentrations (pounds per acre) of chemicals and specific application sites in the form of cut stumps and the furrows girdled into tree boles. Direct contact with herbicides (or feeding on vegetation that has been exposed to herbicides) could potentially harm deer. Deer may be displaced during application of herbicide (due to human disturbance) but this will be for a relatively short period of time in any treatment area. The application of herbicides will lengthen the duration of early seral habitat where applied, thus maintaining appropriate habitat patches for deer.

SUMMARY OF LD50 VALUES FOR TERRESTRIAL SPECIES (TABLE 3.9)

Active Ingredient	LD_{50}*	Toxicity Risk to Rats	Risk Assessment
Glyphosate	>5000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>5000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2004d
Imazapyr	>5000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011b
Triclopyr	>1000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011d

LD_{50}*: lethal dose for 50% of population tested

No Herbicide Use

The No Herbicide Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be similar to the proposed action. However, there would not be as much early seral habitat created nor growth of herbaceous vegetation. This would slightly reduce forage production for white-tailed deer below levels that would occur under the proposed action.

Shaded Fuel Breaks

The Shaded Fuel Breaks Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporate activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

The following projects would be additive effects and would provide additional positive impacts to white-tailed deer populations: Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. The above mentioned projects would open the forest canopy, add increased sunlight to the forest floor, and provide an increased growth of grasses, forbs, legumes, and herbaceous plants. These areas would provide an improved quality deer habitat. Various private land owners surrounding the watershed have early seral habitat, fencerows and hayfields. All of the alternatives would provide positive long-term impacts to white-tailed deer and habitat.

Northern Bobwhite

This species was selected to help indicate effects of management on meeting public hunting demand, and to help indicate effects of management on the pine-oak woodland community. Northern Bobwhites require a diverse, heterogeneous habitat that includes open areas of herbaceous vegetation for foraging, grassy areas for nesting, heavy brush or woody cover, and bare ground with little litter cover (Roseberry & Sudkamp, 1998) (Brennan, Hernandez, & Williford, 2014); Peters (Peters, 2014). They also readily use early pine and pine-hardwood forest conditions for foraging, hiding, nesting, and rearing young (Brennan, Hernandez, & Williford, 2014). Bobwhites are usually associated with early successional plant communities, and their abundant herbaceous plants, seed crops, fruits, and insect prey items are vital to their life history (Dimmick, Gudlin, & McKenzie, 2002) (Brennan, Hernandez, & Williford, 2014).

Population Trends (USDA FS, 2017)

Since 1997, the Ouachita NF has been conducting bird surveys on over 300 Landbird Points. Northern Bobwhite data indicate a downward, but leveling, trend in birds detected over this 21 year period. Since 2006, an 8-year declining trend has continued mirroring this species range-wide population trends. Although 2017 counts were about equal to the preceding eight years, it showed a slight rise from 2016.

Estimated habitat capability for the Northern Bobwhite has been relatively stable since 2006, with a slight decrease after 2008. However, it is still far from reaching the projected 2015 desired Forest-wide habitat capability of 101,748 based on the Forest Plan EIS. One major factor is that the Forest has not met the objective of establishing 5,500 acres of early seral habitat per year since the Forest Plan went into effect. The habitat capability trend has a quite low statistical significance. No data were available for 2015 and habitat capability was not calculated. For 2017, available habitat was capable of supporting 64,665 Northern Bobwhite Quail. There is no significance in the trend.

Regional declining population trends for the Ozark-Ouachita Plateau region are reported by most game and fish agencies or land managers. Regional and range-wide declines are primarily attributed to the loss of habitat on private and agricultural lands and changes in agricultural practices. The Ouachita NF has pursued aggressive prescribed fire and thinning programs that are providing habitat improvements, and it is anticipated that these management actions will soon act positively to overcome the downward trends.

Direct and Indirect Effects

No Action

There would be no direct effects to the northern bobwhite through implementation of the No Action Alternative.

There would be negative indirect effects to the northern bobwhite under the No Action Alternative. Implementation of the No Action Alternative would not provide increases in food production or nesting habitat for northern bobwhite. No early seral habitat would be created and existing forests would be allowed continued growth towards increased canopy closure. This would cause a decrease in food production and nesting habitat. Herbaceous and grassy ground cover would fade and essentially disappear, resulting in loss of brood range and associated seeds and berries and insect and spider populations important to poult growth and development (Fenwood, Urbston, & Harlow, 1984) (Dimmick, Gudlin, & McKenzie, 2002) (Masters & Wilson, 1994). Food production and nesting habitat would still occur and be available within the unmanaged forest but at far reduced levels than what would be expected to occur through forest management and prescribed burning. The negative effects would be expected to continue in the long term at a much greater level through the loss of increased food production, nesting habitat, and brood-rearing habitat because unmanaged forests do not produce high levels of food production and quality habitat for quail.

The No Action Alternative would be expected to provide negative effects on the forest-wide trend for northern bobwhite because no habitat improvement would occur. This would not allow for any potential increase for nesting and foraging opportunities or population growth.

Proposed Action

The proposed action would be expected to provide a positive effect on the forest-wide trend for northern bobwhite because the proposed action would provide improved habitat quality through timber management and associated activities. This increase in habitat quality would be expected to provide increased foraging, nesting, and brooding opportunities and a potential increase in population.

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

Direct effects are possible to the northern bobwhite. Timber harvest, timber stand improvement, midstory reduction, and site preparation have the potential to directly affect northern bobwhites, particularly nests. If these activities occur during nesting season (April through June), the potential exists to destroy nests and eggs through trees or debris falling directly upon nests or

logging equipment or site preparation activities destroying nests. Likewise, nest disturbance from these activities could cause nest abandonment (Brennan L. A., 1999). However, the majority of stands that are proposed for treatment do not currently offer suitable nesting habitat because they are too dense and the presence of nesting birds is unlikely (Brennan, Hernandez, & Williford, 2014). The majority of stands where site preparation treatments would occur typically would not have time to develop suitable herbaceous conditions between harvest completion and implementation. Stands to receive release treatments are older and well established and would have already developed pine and hardwood woody structure and an herbaceous understory. However, woody stems are often dense and do not offer appropriate nesting habitat. If disturbed by management activities, northern bobwhites would attempt to re-nest, though nest success is usually lower during these subsequent efforts (Burger Jr, Ryan, Dailey, & Kurzejeski, 1995).

Positive indirect effects would be expected to occur to the northern bobwhite through the proposed timber harvests, site preparations, and midstory reduction. The Oklahoma Cooperative Extension Service (2000) noted that research conducted by Oklahoma State University has shown northern bobwhite populations increasing significantly in thinned pine and pine/hardwood stands. Evans (1989), Cram et al (2002), Wood et al (2004), Palmer and Wellendorf (2006), and Masters (2007) found that timber harvesting enhances northern bobwhite habitat in terms of vegetation structure and food availability. Habitat conditions for retained hardwood (soft and hard mast-producing trees) would be enhanced (Perry & Thill, 2003) (Perry R. W., Thill, Peitz, & Tappe, 1999). Herbicide application to felled stems would prevent re-sprouting of targeted vegetation and prolong use of these resulting habitat conditions, especially when combined with prescribed fire and/or mechanical treatments (Jones & Chamberlain, 2004) (Welch, Miller, Palmer, & Harrington, 2004).

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

Nests with eggs may be abandoned by mobile adults and destroyed when removal of vegetation occurs in nesting habitat during nesting season. However, the location of these projects are within marginal to below marginal habitat and the chances of bobwhites nesting in these locations is extremely small. Bobwhites may be displaced during periods of high activity. Positive indirect effects would occur after implementation of these activities because firelines and areas where vegetation has been removed would be seeded with native grasses, forbs, and wildflowers or allowed to come back with natural vegetation thus providing additional early seral habitat, which will result in an increase in foraging and brooding habitat.

Wildlife Pond Construction

No direct or indirect effects would be expected to occur from waterhole construction because construction would not take place during nesting season and northern bobwhites do not obtain water requirements from ponds (Evans J. , 2007).

Bluebird Nestboxes

There would be no direct or indirect effects on northern bobwhites from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Direct effects of herbicide application on birds or nests with eggs are not likely because the primary target in these applications would be hardwood brush cut surfaces (stumps or girdle furrows) located in dense forest stands. Neither hardwood brush nor dense stands are preferred nesting habitat due to a lack of grass and herbaceous plants important for nest construction and concealment. Adults and fledglings are highly mobile and would not be directly impacted.

Herbicide application has the potential to temporarily negatively impact foraging and nesting opportunities in small, specific treatment areas by reducing the availability of seeds from woody plants and broadleaf herbaceous species contacted by herbicide. This would be a short-term loss for the specific season of application.

SUMMARY OF LD50 VALUES FOR BIRD SPECIES (TABLE 3.10)

Active Ingredient	LD_{50}*	Toxicity Risk to Bobwhite and or Mallard	Risk Assessment
Glyphosate	>540mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>2150 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2004d
Imazapyr	>2510 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011b
Triclopyr	>116 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011d

LD_{50}*: lethal dose for 50% of population tested

No Herbicide Use

The No Herbicide Alternative would have an overall negative effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Management Alternative would be expected to provide a similar positive effect as the Proposed Action on the forest-wide trend for northern bobwhite because this alternative would provide improved habitat quality through timber management and associated activities. However, this alternative would provide a much lower amount of early seral habitat due to a reduction in acres of seedtree harvest. Early seral habitat would decrease by 481 acres. While early seral habitat is important to northern bobwhites, similar quality habitat can be created through thinning and group selections provided additional management activities such as prescribed burning occur to maintain the habitat in an open condition.

Shaded Fuel Breaks

The Shaded Fuel Break Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporate activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The effects of commercial thinning of vegetation as described above would be additive to these authorized activities. The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. All of the above mentioned projects would open the forest canopy, add increased sunlight to the forest floor, and provide an increased growth of grasses, forbs, legumes, and herbaceous plants. These areas would provide an improved quality northern bobwhite habitat. Various private land owners surrounding the watershed have early seral habitat, fencerows and hayfields. All of the alternatives would provide positive long-term impacts to the northern bobwhite and habitat.

Prairie Warbler

This species was selected to help indicate effects of management on the early successional component of forest communities. A neotropical migrant, it selects early forest stage habitats such as regenerating old fields, pastures, and utility right-of-way habitats (King, Chandler, Collins, Petersen, & Lautzenheiser, 2009). The vegetation selected may be deciduous, conifer, or mixed types. Habitats with scattered saplings, scrubby thickets, cutover or burned over woods, woodland margins, open brushy lands, mixed pine and hardwood, and scrub oak woodlands are most often selected. Habitat conditions for nesting occur in the later stages of early forest cover, when vegetation has grown out of the grass/herbaceous phase.

Population Trends (USDA FS, 2017)

Based on the data available, the prairie warbler shows a slight downward (but not statistically significant) trend since 2012 where it remained through 2014. In 2017, both the habitat and the landbird monitoring indicated another drop that is expected since the amount of early seral habitat is limited. Throughout the prairie warbler range, a downward trend is indicated.

Habitat capability for the prairie warbler on the ONF continues to show a downward trend (which is consistent with range-wide trends and mildly significant), with some hint of having plateaued in the period 2016 - 2017. Habitat capability was not calculated for 2015, and was the lowest calculated since 2006 in 2016, with a slight increase in 2017.

The prairie warbler has a recently declining population on the Forest, based on Landbird Points and habitat capability (these data were unavailable for 2015). Under Forest Plan implementation, early seral stage habitat should continue to increase and then stabilize at approximately 50,000 to 60,000 acres after ten years (USDA Forest Service 2005a, p175); however, just the opposite is happening, with less than 1,000 acres regenerated in 2016 (less than 20% of the Forest Plan objective of 5,500 acres) and 2,050 acres generated in 2017. Data point to a declining population trend for the prairie warbler on the Ouachita NF and survey-wide for the long-term, with such decline considered to be related to the decline in acres of early seral stage habitat available.

The prairie warbler has a declining population trend within the Ouachita NF and throughout its overall range; however, population viability on the Ouachita NF should not be threatened. The population decline has been exacerbated by the fact that the quantity of early seral habitat expected to be produced annually (5,500 acres), largely by seed tree and shelterwood cutting, has not yet been realized. Meanwhile, increases in thinning and prescribed fire in the pine and pine-hardwood types, especially associated with approximately 200,000 acres of shortleaf-bluestem ecosystem restoration, will benefit prairie warbler populations if these management activities are implemented to their full extent.

Direct and Indirect Effects

No Action

The No Action Alternative would likely have an overall negative effect on the forest-wide population trend for this species by lack of creation of foraging and nesting opportunities. This alternative would perpetuate conditions that could keep prairie warbler populations on a downward trend, possibly even jeopardizing the viability of this species within this ecosystem.

Under the No Action Alternative, there would be no additional early seral stage habitat created, thus not allowing this type of habitat to be created within this proposed project area for the northern bobwhite and prairie warbler. There would be no acres of existing early seral stage habitat available for this MIS. The No Action Alternative would not allow for the creation of early seral stage habitat at any point in time unless created by nature. This would be expected to negatively affect the prairie warbler and its habitat. There would not be expected to be any prairie warbler population increase or early seral stage habitat increase through implementation of the No Action Alternative.

Proposed Action

The proposed action would be expected to provide a positive effect on the forest-wide trend for the prairie warbler because the proposed action would provide an increase in early seral habitat and improved habitat quality through timber management and associated activities. This increase in habitat quality would be expected to provide increased foraging, nesting, and brooding opportunities and a potential increase in population.

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

Direct effects are possible to the prairie warbler. Timber harvesting and site preparation have the potential to directly affect this species, particularly nests. Timber harvesting and site preparation activities have the potential to destroy nests and eggs through trees or debris falling directly upon nests or logging or site preparation equipment running the over nests. Likewise, nest disturbance from these activities could cause nest abandonment.

Indirect effects under the proposed actions would be expected to provide a positive benefit for the prairie warbler. The creation of early seral habitat greatly increases nesting habitat for this species. Under the Proposed Action, 537 acres of early seral stage habitat would be created through 56 acres of clearcut and 481 acres of seedtree. These harvest methods would benefit the prairie warbler by creating nesting habitat that would otherwise not occur within the proposed project area. The proposed group openings and commercial thinning/midstory reduction would also provide some level of increased habitat quality for the prairie warbler. Providing a variety of habitats, such as thinned areas and early seral stage habitats, would be very beneficial to prairie warbler.

However, the creation of 664 acres of the group selection management style and harvest technique is extremely limiting for prairie warbler use due to the small sizes of the group openings. Although early seral stage habitat is created by group openings, these openings would not be expected to provide adequate habitat for the prairie warbler. Studies have shown that density and relative abundance of early-successional bird species was reduced in group selection openings compared with larger timber cuts (Alterman, Bednarz, & Thill, 2005) (Costello, Yamasaki, Pekins, Leak, & Neefus, 2000) (Robinson & Robinson, 1999). Alterman et al (2005) found that prairie warblers did not nest in group openings, and singing males were found in only 14% of the openings. This suggests that small-sized group openings are not adequate for the prairie warbler and perhaps other songbirds that rely on early succession habitat.

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

Should these activities occur within the nest season, eggs and nests may be destroyed or abandoned. The likelihood of this occurring is extremely small because the current habitat in areas proposed for these activities is very poor for use by prairie warblers. Warblers may be displaced during construction and periods of high activity, though would return after the disturbance. Indirect effects would be similar to those analyzed under silvicultural treatments for thinning.

Wildlife Pond Construction

Direct effects could occur if this activity occurs during the nesting season (May-July). Nests and/or eggs may be destroyed or nests may be abandoned. If this occurs outside of the nesting season, no direct effects would occur. Indirect effects would be similar to those analyzed under silvicultural treatments for thinning.

Bluebird Nestboxes

There would be no effect on northern bobwhites from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm warblers. Glyphosate, Imazapic, Imazapyr, and Triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on warblers. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to warblers. Herbicide applications could help create and maintain additional patches of early successional habitat. See Table 3.10 for a list of toxicity ratings to bird species for each herbicide proposed for use.

No Herbicide Use

The No Herbicide Alternative would have an overall negative effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Management Alternative would have an overall negative effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to seedtree harvests would not occur. There would be a major decrease in early seral habitat and the size of the group openings would not be adequate for nesting prairie warblers (Alterman, Bednarz, & Thill, 2005) (Costello, Yamasaki, Pekins, Leak, & Neefus, 2000) (Robinson & Robinson, 1999).

Shaded Fuel Breaks

The Shaded Fuel Breaks Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporates activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

The following projects would be additive effects and would provide additional positive impacts to white-tailed deer populations: Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. All of the above mentioned projects would open the forest canopy, add increased sunlight to the forest floor, and provide an increased growth of grasses, forbs, legumes, and herbaceous plants. These areas would provide an improved habitat quality for prairie warblers. All of the alternatives would provide positive long-term impacts to prairie warblers and habitat.

Eastern Wild Turkey

Eastern Wild Turkey was selected to help indicate effects of management on meeting public hunting demand. This species is a highly prized game animal that uses a wide range of habitat types (generalist) with habitat diversity needs that include grass and forb openings (seeds, fruits, berries, insects) interspersed with older timber stands capable of producing hard (acorns) and soft (fruits/berries) mast (McRoberts, Wallace, & Eaton, 2014). Various successional forest conditions, ranging from early forest stage cover to mature growth, are required to meet the needs of turkey populations.

Population Trends (USDA FS, 2017)

A stabilized trend is suggested for the turkey population on the Forest based on habitat capability modeling. In addition, the drop in turkey harvest and birds detected on the Landbird Points data would indicate a reduction in the number of turkeys forest-wide. Still, habitat capability remains above the level projected in the 2005 Forest Plan. The sustained high levels of habitat capability may indicate that the reductions in poults per hen and birds detected on the Landbird Points are due to factors other than habitat suitability or availability.

Turkey poult production and birds detected on Landbird Points and habitat capability were down in 2017 compared to previous years, up in 2014 compared to 2016; however, harvest trends appear to be upward. Insufficient data exist to suggest that Eastern Wild Turkey may be in danger of losing population viability or falling below desired population levels. In addition to harvest levels, weather conditions and predation may be having a negative impact on the turkey. Data are contradictory, with habitat projections and poult production reflecting a slightly negative, but stabilized, trend in the past few years, and harvest and Landbird Points down from 2006 levels in most years. Due to conflicting indicators, more research should be conducted to determine if additional management changes are warranted.

Habitat capability for 2017 is estimated at 14,426 turkeys. This amount of habitat would indicate a downward trend in habitat capability for the years 2006 to 2009 then stabilizing at a lower number of acres through 2017. Overall, the Forest appears to have habitat to support numbers exceeding the minimum population objective of 3.3 turkeys per square mile (9,177 turkeys) for the first period (10 years) of the Forest Plan.

Direct and Indirect Effects

No Action

There would be no direct effects to the eastern wild turkey through implementation of the no action alternative.

However, indirect effects would occur to this MIS. Under this alternative, there would not be any increase in habitat quality and forage production. The stands would be allowed to continue towards maturity, which would provide increased canopy closure. The canopy closure would continue to block out sunlight, and the stands would move towards decreased food production. Over the long-term, these stands would provide decreased production of grasses, forbs, and legumes, which are the most important food items and habitat components for eastern wild turkeys. Unmanaged stands do not provide as much wildlife food production as managed stands (Masters & Wilson, 1994). This is due to the closed canopy condition created by allowing reduced sunlight to reach the forest floor and allowing the forest to mature to a climax community.

The No Action Alternative would be expected to provide negative effects on the forest-wide trend for northern bobwhite because no habitat improvement would occur. This would not allow for any potential increase for nesting and foraging opportunities or population growth.

Proposed Action

The Proposed Action would have an overall positive effect on the forest-wide population trend for this species by increasing foraging opportunities.

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

Direct effects are possible to the eastern wild turkey. Timber harvesting, temporary road construction, and midstory removal have the potential to directly affect turkeys, particularly nests. These activities have the potential to destroy nests and eggs through trees or debris falling directly upon nests or logging equipment running the over nests. Likewise, nest disturbance from these activities could cause nest abandonment. Re-nesting would likely occur in most situations of disturbance thus offsetting some of the losses in brood production.

Positive indirect effects would be expected to occur to eastern wild turkey through the proposed timber harvests and midstory removal. Exum et al (1987) found that commercial thinning improved turkey habitat due to the reduction in canopy cover increasing the understory growth and soft mast production. Smith (2010) and Bidwell (undated) concluded that proper thinning promotes stand characteristics in pine habitats that are desirable for wild turkey habitat. Stewart (2001) and Miller and Conner (2007) found that hens nest in thinned pine plantations and these plantations provide excellent brood habitat. Exum et al (1987) concluded preferred brood habitat was characterized by a high diversity of understory species, a low number of midstory stems, and high visibility of 1.6 feet.

There would be no direct effects on adult birds or mobile chicks from site preparation or release activities (hand tools or herbicide). Existing nests with eggs may be damaged, destroyed or abandoned if operations occur during the nesting season. The majority of stands to receive site preparation treatment would not have time to develop suitable nesting habitat conditions between harvest completion and the implementation of site preparation activities, although grassy patches used for nesting could exist. Stands to receive release treatments would have already developed pine and hardwood woody structure and an herbaceous understory but woody stems could be too dense to offer good nesting habitat. Prior to release, utilization of untreated stands would be unlikely. Turkey may be temporarily displaced during resource management.

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

Nests with eggs may be abandoned by mobile adults and/or destroyed when road or fireline construction, shaded fuelbreaks, or mechanical removal of vegetation occurs during the nesting season. Eastern wild turkeys may be displaced during periods of high activity. Positive indirect effects would occur after implementation of these activities because these areas would be seeded with native grasses, forbs, and wildflowers or allowed the come back with native vegetation thus providing additional early seral habitat, which will result in an increase in foraging and brooding habitat.

Wildlife Pond Construction

Direct effects could occur if this activity occurs during the nesting season (March-July). Nests and/or eggs may be destroyed or nests may be abandoned. If this occurs outside of the nesting season, no direct effects would occur. Indirect effects would be similar to those analyzed under silvicultural treatments for thinning.

Bluebird Nestboxes

There would be no effect on eastern wild turkeys from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Direct effects of herbicide application on birds or nests with eggs are not likely because the primary target in these applications would be felled hardwood brush cut surfaces (stumps or girdle furrows) located in dense forest stands. However, contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm turkeys. Glyphosate, Imazapic, Imazapyr, and Triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on turkey. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to turkeys. Herbicide applications could help create and maintain additional patches of early

successional habitat. Overall, any negative direct effects would be far outweighed by the beneficial indirect effects of this alternative. Table 3.10 lists the toxicity ratings to bird species for each herbicide proposed for use.

Herbicide application has the potential to temporarily negatively impact foraging and nesting opportunities in small, specific treatment areas by reducing the availability of seeds from woody plants and broadleaf herbaceous species contacted by herbicide.

No Herbicide Use

The No Herbicide Alternative would have a positive overall effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Management Alternative would have a positive overall effect on the forest-wide population trend for this species. The effects of this alternative would be similar to those of the proposed action. Commercial thinning and group selection would provide quality turkey habitat as this species is not dependent upon early seral habitat.

Shaded Fuel Breaks

The Shaded Fuel Breaks Alternative would have an overall positive effect on the forest-wide population trend for this species. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporates activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

The following projects would be additive effects and would provide additional positive impacts to white-tailed deer populations: Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. All of the above mentioned projects would open the forest canopy, add increased sunlight to the forest floor, and provide an increased growth of grasses, forbs, legumes, and herbaceous plants. These areas would provide an improved quality norther bobwhite habitat. Various private land owners surrounding the watershed have early seral habitat, fencerows and hayfields. All of the alternatives would provide positive long-term impacts to eastern wild turkeys and habitat.

<u>Pileated Woodpecker</u>

This woodpecker was selected as an MIS to help indicate the effects of management on snags and snag-dependent species. The Pileated Woodpecker is a member of the cavity nesting, tree trunk probing, insectivore guild that is found in open, upland mature pine and pine-hardwood

stands and dense mature to over-mature hardwood and hardwood-pine forest types (Degraaf, Scott, Hamre, Ernst, & Anderson, 1991) (Hamel, 1992) (Bull & Jackson, 2011). A year-round resident of the Ouachita Mountains, this bird is a primary excavator of cavities important to obligate secondary cavity nesters (animals that do not themselves excavate cavities), and is a key indicator for the retention of a complete community of cavity nesting species that include other birds, mammals, reptiles, and amphibians (Bonar, 2000) (Trauth, Robison, & Plummer, 2004).

Population Trends (USDA FS, 2017)

Ouachita NF Landbird Point data and habitat capability data both indicate a downward trend for the Pileated Woodpecker. Monitoring data on the Ouachita NF based on Landbird Points indicate the long term trend to be slightly decreasing for Pileated Woodpecker; however, this is not reflecting the fact that across the Ouachita NF the trend is for the forest to age overall. This is mildly significant. The CompPATS wildlife model takes into account the conditions in all forest types, and it factors in management practices including prescribed fire and thinning. These data show a downward trend since FY 2006, although the last six years the trend has been increasing. The data also indicate that the Forest is still well within the desired habitat capability projected for 2015. Overall population trends should continue to improve as the unmanaged hardwood and hardwood-pine and the managed pine stands age. The current habitat capability that is estimated to support approximately 13,652 birds exceeds the 2005 Forest Plan bird population objectives of 11,265 for 2015 (USDA Forest Service, 2005a).

The Pileated Woodpecker and its habitat appear to be secure within the Ouachita NF. There are no indications of a need to alter management direction.

Direct and Indirect Effects

No Action

The No Action Alternative would have an overall positive effect on the forest-wide population trend for this species due to the retention of dead and dying trees found throughout the landscape.

The retention of the existing forested conditions without disturbance would offer suitable nesting and foraging habitat. All timber would increase in size eventually providing snags of suitable size for cavity excavation and basal areas would remain high and less open than treated stands in other alternatives. Snags would be recruited as logs without potential loss due to consumption by prescribed fire. Hard mast production would increase until overcrowding and competition for nutrients, water and space occurred, and then level-off and/or decline. Age of timber would also factor in reduced mast production levels as trees move past their maximum reproduction potential. Soft mast from trees would be produced but at lesser levels due to shading from the overstory. Soft mast from herbaceous plants and shrubs would decline and eventually fade as openings were shaded except in tree-fall gaps and where stochastic events occurred.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

The Proposed Action would be expected to have a slight negative effect on forestwide trends for pileated woodpeckers due to the removal of mature trees.

Felling/damaging large snags during the nesting season could result in loss of eggs or nestlings. Abandonment of nests and/or displacement of adult woodpeckers may occur during resource management activities, but mobile adult and juvenile birds would not be directly impacted.

Thinning harvests in older pine types may offer areas for nest establishment when snags and trees of suitable dbh are available. Not retaining large diameter snags during follow-up silvicultural activities would negatively affect nesting opportunities. The acreage of older, larger pine trees would be reduced following commercial timber sales, especially in seed tree areas and where permanent openings were established and maintained. Clearcut, seedtree, and group selection areas would not offer suitable nesting habitat or adequately sized snags for decades, depending on site productivity.

Areas where stem density was significantly reduced would result in elevated fruit and seed production and insect populations that could provide foraging sites for up to a decade (Edworthy, Drever, & Martin, 2011). Treatment of some hardwood stands for midstory removal and overstory development of residual trees would provide long-term benefits to this bird by allowing residual stems to grow larger due to reduced competition, resulting in large numbers of snags. Not treating other hardwood stands would provide for a diverse mix of hardwood stands and stem densities. Meeting Revised Forest Plan design criteria WF005 (snags), WF006 (mature growth) and WF007 (woody debris) would provide preferred Pileated Woodpecker habitat in the project area.

Small diameter woody debris generated through release activities would not provide preferred or typical foraging substrate for this bird, which prefers large diameter logs and snags that have deteriorated to the point where invasion by insect prey is possible (Hura & Crow, 2004). Larger diameter woody debris generated by site preparation could eventually provide habitat for insects and foraging substrate for this woodpecker, but not immediately. Increased forest floor light levels would enhance growth of herbaceous plant and grass species important in the production of soft mast and vegetative cover for various prey populations.

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

Nests with eggs may be destroyed or abandoned if these activities result in the removal of snags containing nests. Mobile adults would not be impacted. Woodpeckers may be displaced from nest sites if these activities occur adjacent to occupied snags. Indirect effects would be similar to those discussed above for thinning.

Wildlife Pond Construction

Direct effects may occur to the pileated woodpecker should roosting cavity trees be removed during construction. Positive indirect effects would be expected to occur through providing increased water sources.

Bluebird Nestboxes

There would be no effect on eastern wild turkeys from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Coming in direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm woodpeckers, Glyphosate, Imazapic, Imazapyr, and Triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Acute oral and dietary studies of the listed chemicals exhibit a range in analysis toxicity from practically nontoxic to slight toxicity to birds. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on woodpeckers. Vegetation impacted by herbicide treatment is not typically used as foraging substrate by woodpeckers because it decomposes rapidly and does not host preferred insect prey species. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to woodpeckers. Table 3.10 lists the toxicity ratings to bird species for each herbicide proposed for use.

Logs and snags used as primary foraging substrate would not be treated. Indirect effects would most likely be due to temporary loss of some woody shrubs, and annual and perennial broadleaf herbaceous plant species that provide shelter and food sources for insect and spider populations that may contribute to this bird's diet.

No Herbicide Use

The No Herbicide Alternative would have no effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Management Alternative would be expected to have a slight negative effect on forest-wide trends for pileated woodpeckers due to the removal of mature trees. The effects of this alternative would be similar to those of the Proposed Action except the effects attributed to seedtree harvesting would not occur. This would be a positive effect as it would leave more snags and live trees that serve as foraging as well as could serve for nesting in the future.

Shaded Fuel Breaks

The Shaded Fuel Break Alternative would be expected to have a slight negative effect on forest-wide trends for pileated woodpeckers due to the removal of mature trees. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporates activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

The following projects would be additive effects and would provide additional positive impacts to white-tailed deer populations: Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. All of the above mentioned projects would be similar in effects to the proposed action. None of the alternatives would not provide long-term negative impacts to pileated woodpeckers or habitat.

Scarlet Tanager

Preferred habitat for this Neotropical migrant is composed of older growth, uneven-aged forests with a well-developed but broken canopy and a well-developed woody and herbaceous understory. This species is abundant in mature hardwood stands and hardwood stands harvested by single tree selection in the central hardwood forests of the nearby Ozarks, but it is uncommon or not present in loblolly and shortleaf pine forests (Rosenberg, et al., 1999) (Hunter, Dickson, Pashley, & Hamel, 2001). However, in a study area that included the Ouachita Mountains of Arkansas, this species did not show a preference between mixed deciduous/coniferous forest habitats. Further studies have found that Scarlet Tanagers typically inhabit areas with high canopy, dense canopy cover, a large variety of tree species, a high density of large trees, and steep slopes (Mowbray, 1999). This species is insectivorous during the breeding season, with prey items including caterpillars, moths, bees, wasps and beetles. Foraging primarily occurs in the mid-canopy. From late summer their diet includes many berries and other fruits that appear to be especially important for fat deposition before fall migration.

Population Trends (USDA FS, 2017)

The Landbird Points data collected from FY 2006-2017 suggest an overall decreasing trend for the Scarlet Tanager; however 2017 showed higher numbers than in 2016, similar to 2014 and 2015. The last 4 years have shown the lowest numbers in the past 12 years. The trend is not statistically significant and the population could reflect natural variability.

Similar to Landbird Point data, Ouachita NF habitat capability data point to a (statistically significant) downward trend for Scarlet Tanager since 2006, although habitat capability has been relatively stable for the last 7 years. Habitat capability was not calculated for 2015.

Recent data show a stable trend on the Ouachita NF and the Ozark-Ouachita Plateau where mature hardwood and mixed types are represented. On the Ouachita NF, there are over 200,000 acres of hardwood and hardwood/pine forest types greater than 41 years old. The Scarlet Tanager and its habitat are secure within the Ouachita NF, and the continued long-term viability of this species is not in question.

The Scarlet Tanager may be decreasing gradually within the Ouachita NF and the Ozark and Ouachita Plateau but appears secure within its overall range. The viability of this species is not in question; however, it will be retained as an indicator species and monitoring will continue.

Direct and Indirect Effects

No Action

The No Action Alternative would have no effect on the forest-wide population trend for this species. The retention of existing pine and hardwood forested conditions without human-caused disturbance would continue to offer nesting and foraging habitat.

Under this alternative, there should be no substantial cumulative effects on this tanager, given the stability of the mature hardwood forests that it inhabits and the stable population trend it holds across its overall range. Although scarlet tanager numbers are declining in some habitats, they still far exceed the projected levels in the RLRMP (USDA Forest Service, 2005b) and indicate a + 1.2% increase in the Ozark-Ouachita Plateau.

Proposed Action

The Proposed Action would be expected to have a slight negative effect on forest-wide trends for scarlet tanagers due to the removal of mature trees.

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

The felling of timber from hardwood or mixed stands of older pine and hardwood may result in loss of eggs or nestlings, if present, but would have no effect on mobile adult birds. Direct effects on nests with eggs or hatchlings would be unlikely to occur in commercially harvested pine forest types because pine forests are not preferred nesting habitat. Direct effects to nests with eggs or nestlings could occur in hardwood stands receiving midstory and/or overstory treatments where stems may be felled. Ideally this would be avoided by performing these actions outside of the primary nesting season.

The reduction in trees in seed-tree harvest areas would increase the herbaceous and grass species important for fruit, berry and seed production and insect and spider populations. Such areas would provide good foraging habitat during nesting season (insects) and as birds fatten for migration (fruits/berries/seeds), especially when located adjacent to their preferred, mature hardwood or hardwood-pine conditions (Mowbray, 1999). However, early seral created near mature hardwood might create an edge-effect and could cause nest parasitism by brown-headed cowbirds. Wildlife Habitat Improvement (midstory removal and overstory development in hardwood/hardwood-pine forest types) would indirectly impact this bird in two ways: the removal of some but not all of the midstory would reduce the areas available for nest placement. Further, the spacing of overstory trees would enhance future development of older growth and old growth conditions readily used by this bird, due to the well-developed but broken forest canopy conditions that result from this treatment.

Released sites would offer some foraging opportunities. Site prep areas would set the stage for abundant ground cover with increased foraging opportunities. However, these opportunities would fade in less than 10 years.

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

If these activities occur during the nesting season (May-July), nests with eggs may be destroyed or abandoned. Mobile adults would not be impacted. Tanagers may be displaced from nest sites if these activities occur adjacent to occupied snags. Birds may be displaced from nest sites, especially if activities occur adjacent to occupied nests. Indirect effects would be similar to those discussed above for thinning.

Wildlife Pond Construction

There would be no direct or indirect effects to this species from the construction of waterholes.

Bluebird Nestboxes

There would be no effect to this species from the placement of bluebird nestboxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Coming in direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm tanagers, Glyphosate, Imazapic, Imazapyr, and Triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on tanagers. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Since tanagers are primarily mid-to-upper canopy foragers it is unlikely that effects of herbicide application would be encountered. However, tanagers feed on a wide variety of insect prey, many of which spend time in or traveling through understory vegetation where herbicide application would occur. Although tanagers may consume some insect prey that has been

exposed to herbicide treatments the realistic dose estimates for such exposures would be insignificant. Also, given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to tanagers. Table 3.10 (above) lists the toxicity ratings to bird species for each herbicide proposed for use.

Herbicide would not be applied to midstory vegetation at a height where nests would occur. Felled stems in midstory and overstory would have herbicide applied to girdled furrows and/or stumps. Given the low risk of toxicity exhibited in invertebrates, no indirect effects to this bird are expected from consumption of insects or fruits/berries/seeds within treated areas.

No Herbicide Use

The No Herbicide Alternative would have little to no positive or negative effect on the forest-wide population trend for this species. The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven-Aged Management Alternative would be expected to have a slight negative effect on forest-wide trends for scarlet tanagers due to the removal of mature trees. The effects of this alternative would be the same as the proposed action except the effects attributed to seedtree harvest would not occur. The areas proposed for commercial thinning instead of seedtree would provide suitable habitat for scarlet tanagers and be retained within the existing habitat base.

Shaded Fuel Breaks

The Shaded Fuel Breaks Alternative would have a slight negative effect on forest-wide trends for pileated woodpeckers due to the removal of mature trees. The effects of this alternative would be similar to the proposed action because shaded fuel breaks incorporates activities already analyzed within the Proposed Action (thinning and mechanical removal of vegetation).

Cumulative Effects

The following projects would be additive effects and would provide additional positive impacts to white-tailed deer populations: Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects would be similar among all alternatives. All of the above mentioned projects would provide effects similar to those discussed in the proposed action. None of the alternatives would not provide long-term negative impacts to pileated woodpeckers or habitat.

Aquatic MIS

AQUATIC MIS AND ASSOCIATED PURPOSES (TABLE 3.11)

Life Form	Common Name	Scientific Name	Primary Reason for Selection
Fish	Bluegill	*Lepomis macrochirus*	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion.
Fish	Creek Chubsucker	*Erimyzon oblongus*	
Fish	Green Sunfish	*Lepomis cyanellus*	
Fish	Highland Stoneroller	*Campostoma spadiceum*	
Fish	Longear Sunfish	*Lepomis megalotis*	
Fish	Orangebelly Darter	*Etheostoma radiosum*	
Fish	Redfin Darter	*Etheostoma whipplei*	
Fish	Yellow Bullhead	*Ameiurus natalis*	
Fish	Smallmouth Bass	*Micropterus dolomieu*	To help indicate effects of management activities on meeting public fishing demand in streams

Present Conditions

The project area contains both perennial and intermittent streams. Intermittent streams tend to pool or dry-up during hot summer months, a common phenomenon in the Ouachita Mountains (Homan, Girondo, & Gagen, 2005). Because these streams may temporarily resume flow following rain events, the alternating dry and wet conditions constitute a pulsating environment (Rose, Simpson, Ott, Manning, & Martin, 2010) which undoubtedly affects fish species composition and presence in these upland waterways.

Bluegill

Bluegill was selected as an MIS because it is a highly sought-after demand species. Bluegill are among the most widespread and numerous species found within the Forest's lakes and ponds. Its viability as a species within the Forest is not in question. This species is regularly stocked in all new and reclaimed ponds and lakes as a valuable component of the sport fish fishery.

Creek Chubsucker

The Creek Chubsucker range extends from the eastern U.S. from New Brunswick to Florida and west to Iowa, Texas and southeastern Oklahoma. The Creek Chubsucker is widespread in Oklahoma occurring in all major drainages. It prefers small creeks and streams of moderate gradient. It lives in quiet waters in vegetation, over sand, gravel-bottomed, or debris-laden substrates and is somewhat intolerant of heavy silt loads. Although widely distributed and common in Oklahoma, populations of Creek Chubsuckers tend to be small.

Green Sunfish

The green sunfish is a highly adaptable game species capable of tolerating a wide range of ecological conditions and is found in a variety of aquatic environments. This fish is common in the Ouachita Mountains. Population densities have been shown to be similar in managed and unmanaged streams during most sample years. Populations of Green Sunfish fluctuate from year-to-year but appear to be increasing on the Forest. The conservation of the species is not in question (USDA Forest Service, 2011).

Highland Stoneroller

The Highland Stoneroller is a small non-game fish found throughout the Ouachita Mountains. It is often the most abundant species in small, clear, upland streams where it occurs in schools. Population densities in managed and unmanaged streams are similar in most sample years and appear stable with few exceptions. Highland Stonerollers are common across the Forest and although populations may fluctuate from year-to-year they appear to be stable. The conservation of this species is not in question (USDA Forest Service, 2011).

Longear Sunfish

The Longear Sunfish is a game species found most commonly in small clear upland streams with rocky bottoms and permanent to semi-permanent flow, rocky substrate, and low turbidity, but also occurs in a variety of other aquatic habitats. Populations of Longear Sunfish fluctuate from year-to-year but appear stable over time. Forest management activities appear to have no adverse effect on longear populations and there are no viability concerns for their population (USDA Forest Service, 2011).

Orangebelly Darter

Orangebelly Darters occur in a variety of habitats from small, gravelly, high-gradient streams, to larger, more sluggish lowland rivers. This darter is most common in clear, gravel cobble-bottomed streams with moderate to high gradient (Robison & Buchanan, 1988). Orangebelly Darters are relatively abundant in the ONF, particularly in the Lower Ouachita Mountain Ecoregion. Population densities appear to fluctuate but remain relatively stable over time. The conservation of this species across this ecoregion is not in question. Based on Basin Area Stream Surveys and other Forest stream surveys, there appears to be no adverse effect on Orangebelly Darter populations from forest management activities.

Redfin Darter

The Redfin Darter is abundant in Ouachita Mountain streams. Population densities of managed and unmanaged reference streams are similar. Darters, especially of the genus *Etheostoma*, are sensitive to habitat degradation because of their specificity for reproduction and feeding in benthic habitats (Karr, 1986) (Robison & Buchanan, 1988). Such habitats are degraded by activities that result in siltation and habitat alteration. Populations of this species fluctuate from year-to-year, but are considered stable. There appear to be no adverse effects on redfin darters from forest management activities and the conservation of the species is not in question (USDA Forest Service, 2011).

Smallmouth Bass

The Smallmouth Bass is an inhabitant of cool, clear mountain streams with permanent flow and rocky bottoms. The Smallmouth Bass is less tolerate of habitat alteration in comparison to the other two black basses (Spotted and Largemouth Bass), and it is especially intolerant of high turbidity and siltation (Robison & Buchanan, 1988). The Basin Area Stream Survey data on the ONF indicate that both site occurrence percentages and population densities of Smallmouth Bass are similar between reference and managed watersheds. There appear to be wide fluctuations in populations of smallmouth bass with no apparent trends. Populations in reference and managed streams are comparable and the conservation of this species is not in question.

Yellow Bullhead

The Yellow Bullhead is a heavy-bodied, small-eyed catfish widely distributed and found throughout the state. This species occupies a variety of habitats but prefers clear, gravel and rocky-bottomed, permanent streams where it avoids strong current. This fish is also common in reservoirs. Although viability of this species is not in question, managed and unmanaged streams have seen declines in percent occurrence of bullheads in Basin Area Stream Survey samples, possibly due to siltation of streams from travel-ways due to inadequate road maintenance (USDA Forest Service, 2011).

Direct and Indirect Effects

No Action

This alternative will have no direct, indirect, or cumulative effects on aquatic MIS. No action would be taken, leaving only natural disturbances to result in changes to the aquatic communities in the proposed project area. This would be neither detrimental nor beneficial to aquatic MIS species. Implementation of this action should not have an impact on future Forest trends for these species.

Proposed Action

Direct, Indirect, and Cumulative Effects

Although proposed activities (soil disturbing actions) would result in sediment entering streams, potentially affecting these aquatic species, the Proposed Action would have no effect on Forest-wide population trends. Risk levels to aquatic biota of the subwatersheds occurring in the project area are low and moderate (see Table 3.4 of this document).

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction)*

Timber management activities are unlikely to cause direct effects; however, indirect effects may occur from increased sedimentation in the waterways from run-off. Effects to these species are expected to be minimal, since these species and associated habitats are currently protected by streamside management areas, BMPs, as defined in the Revised Forest Plan.

Road/Fireline Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding

In the proposed action, drainage structures are to be installed, and road/firelines are to be reconstructed/constructed and shaped resulting in the removal of vegetative cover and soil disturbance which would temporarily increase sedimentation, concentrate runoff, and potentially impact water quality for these MIS fish. Conversely, existing sedimentation would be reduced by proposed reconstruction and road maintenance treatments. The potential for sedimentation would be reduced by implementing Revised Forest Plan design criteria: firelines crossing streamside management areas would be constructed using hand tools (however, the heavy equipment may have to traverse the streamside management area but any blades or plows would be lifted); and firelines would be water barred and seeded after construction. There is the potential for fish to be crushed by any equipment or vehicle crossing a stream but that is fairly unlikely and/or would be very few individuals.

Wildlife Pond Construction

Wildlife ponds within the project area are meant to provide a source of water and habitat for non-fish species such as amphibians, reptiles, insects and other non-fish species. No direct or indirect impacts to these MIS fish are anticipated. Ponds are not to impound any live water where these fish species would be found.

Bluebird Nestboxes

There would be no direct or indirect effects from the placement of bluebird boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Herbicides would be applied to upland terrestrial habitats. When herbicides are applied, there is a risk that the chemical could move offsite, possibly entering streams or ponds. Herbicides would not be applied to vegetation in Streamside Management Areas, within 100 feet of perennial streams, nor within 30 feet of intermittent stream channels (USDA Forest Service, 2005a). These SMAs would buffer streams and other waterbodies by arresting movement of run-off water and preventing entry of herbicide into the aquatic ecosystem.

In the proposed action, Glyphosate, Imazapic, Imazapyr, and Triclopyr may be used for site preparation, and seedling release. Neither the published literature nor the U.S. EPA files (U.S. EPA/OPP 1993, 1998) include data regarding the toxicity of these chemicals or their formulations on these MIS fish species. Most all bioassay studies use various fish species, mainly bluegill, which has been used as the closest representative in the table below.

SUMMARY OF LD50 VALUES FOR BLUEGILL (TABLE 3.12)

Active Ingredient	LD50*	Toxicity Risk to Bluegill	Risk Assessment
Glyphosate	70-170mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2011
Imazapic	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004
Imazapyr	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Triclopyr	Varies greatly with formulation	Appears to be somewhat toxic with great variation	Syracuse Environmental Research Associates, Inc. 2011b

LD50* - lethal concentration for 50% of population tested

Herbicide application in site preparation and timber stand improvement areas is not likely to have any impacts on MIS fish. All streams would be protected by 30 and 100-foot herbicide application buffers and all source waters would be protected by 300-foot buffers. Buffers are to be clearly marked (design criteria HU006) before treatment so applicators can easily see and avoid them (USDA Forest Service, 2005a).

No Herbicide Use

The No Herbicide Alternative would have no effect on the forest-wide population trend for these species. The effects of this alternative would be the same as the Proposed Action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The Uneven Aged Management Alternative would have no effect on the forest-wide population trend for these species. The effects of this alternative would be similar to those of the Proposed Action

Shaded Fuel Breaks

The Shaded Fuel Break Alternative would have no effect on forest-wide trends for these species. The effects of this alternative would be similar to the proposed action.

Cumulative Effects

Approximately 297 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA). The Rock Shop fire scar (2014) that was seeded and is currently in regeneration resulted in 13 acres of early seral habitat. This currently is the only early seral habitat in the project.

Cumulative effects are similar among all alternatives. Clearcuts and seedtrees contribute the most to the sedimentation levels. As disclosed in the Water Quality section, risks to beneficial uses remain low for all alternatives.

Proposed, Endangered, Threatened, and Sensitive Species (PETS) & Habitat

All PETS species were reviewed for occurring or potentially occurring in the analysis area and their habitats. The species reviewed are found in the U.S. Fish and Wildlife Service's Threatened and Endangered Species List or the Regional Forester's Sensitive Species list. The table below lists PETS species that are determined to occur, potentially occur, or have suitable habitat within the proposed project area.

PETS SPECIES EVALUATED (TABLE 3.13)

COMMON NAME	SCIENTIFIC NAME	STATUS
Mammals		
Northern long-eared bat (NLEB)	*Myotis septentrionalis*	**T**
Birds		
Bachman's sparrow	*Aimophila aestivalis*	**S**
Insects		
Diana fritillary (butterfly)	*Speyeria diana*	**S**
Plants		
Ozark chinquapin	*Castanea pumila ozarkensis*	**S**
Ouachita leadplant	*Amorpha ouachitensis*	**S**
Pineoak jewelflower	*Streptanthus squamiformis*	**S**
Waterfall's sedge	*Carex latebracteata*	**S**

T – Federally Threatened
S – Forest Service 'Sensitive' species

Northern long-eared bat - threatened

Direct and Indirect Effects

No Action

This alternative would have no direct effects on the NLEBs bats. Indirect effects would include the natural succession of early seral habitats into mature forest. This process could result in an overall decline of foraging habitat and open mid-story for ease of movement.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction),* ***Road/Fireline Construction, Wildlife Pond Construction, and Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks)***

Direct effects are possible to the NLEB during harvest treatments, site preparation, midstory reduction, timber stand improvement, pond construction, mechanical removal of vegetation along existing roads, fireline construction, and road construction/relocation as tree felling could

displace a bat roosting in a tree or possibly cause mortality of a roosting adult or a non-volant juvenile bat that cannot fly away. If displaced from a roost site, an individual would likely relocate to an alternate site in nearby habitat. Displacement is probably minor, as some bats appear to be flexible in roost site selection and often only occupy roost trees for short periods of time (Kurta, King, T'eramino, Stribley, & Williams, 1993). The literature reviewed contains no reports of NLEB mortality resulting from tree harvest (USDI Fish and Wildlife Service, 2015). Due to their small size, it is extremely unlikely to detect a NLEB killed or injured by tree felling in a forested setting.

Timber and vegetation management does not appear to be a deterrent to the NLEB and is actually beneficial to this species. Studies throughout North America suggest that most bats avoid highly cluttered areas and prefer to forage and travel in areas with less clutter (Brigham, Vonhof, Barclay, & Gwilliam, 1997) (Erickson & West, 2003) (Hayes & Loeb, 2007) (Humes, Hayes, & Collopy, 1999). Bats are often more active in early and late-seral stages which are usually less cluttered than in intermediate forest stages (Burford & Lacki, 1995) (Erickson & West, 2003) (Humes, Hayes, & Collopy, 1999) (Loeb & O'Keefe, 2006) (Menzel, et al., 2005). Thinning may reduce clutter and lead to increased bat activity (Erickson & West, 2003) (Lacki, Hayes, & Kurta, 2007), although some studies suggest no response by bats to thinning (Tibbels & Kurta, 2003). Responses to clutter differ among bat species. Differences in bat size (mass), bat morphology and the echolocation frequencies used among species are believed to make some species more adapted to foraging in cluttered habitats, whereas others are more adapted to foraging in open habitats (Aldridge & Rautenbach) (Norberg & Rayner, 1987). NLEBs and Indiana bats may readily utilize cluttered forests (Broders, Findlay, & Zheng, 2004) (Ford, Menzel, & Rodrigue, 2005) (Owen, et al., 2003) (Schirmacher, Castleberry, Ford, & Miller, 2007).

Menzel et al (2002) found NLEB roosting in intensively managed stands in West Virginia. At the same study site, Owen et al (2002) concluded that NLEB roosted in areas with abundant snags, and that in intensively managed forests of the central Appalachians, roost availability was not a limiting factor. Perry and Thill (2007) tracked NLEB in central Arkansas and found roosts in eight different forest classes, including partially thinned mixed pine-hardwood forests which was one of the three categories that supported the most roosts. Timber removal creates canopy openings in an otherwise densely-forested setting, which may promote more rapid development of bat pups. In mature forests on the Sumter National Forest in northwestern South Carolina, 10 of the 11 stands in which NLEB were detected were mature stands (Loeb & O'Keefe, 2006). Within those mature stands, NLEB were recorded more often at points with sparse or medium density vegetation than at points with dense vegetation, suggesting that small openings within forest stands facilitate commuting and/or provide suitable foraging habitat.

Bluebird Nestboxes, and Erosion Control/Pollinator Habitat Improvement Seeding

No direct or indirect effects would occur from placement of bluebird nest boxes, and seeding of areas where vegetation has been mechanically removed.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

The influence of chemicals and bat/prey relationships have not been well studied. Insecticides can have a direct impact on prey availability by reducing insect abundance. Herbicides often have an indirect influence on insect populations by changing the abundance and composition on plant communities upon which insect communities rely (Guynn Jr, Guynn, Wigley, & Miller, 2004). No data are available on the effects of herbicide treatments on insects commonly consumed by bats.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The effects of this alternative would be similar to the proposed action except that a larger majority of the forest would remain intact and not be harvested by seedtree method. This would provide additional habitat for the NLEB above what is provided for in the Proposed Action.

Shaded Fuel Breaks

The effects of this alternative would be similar to the proposed action.

Cumulative Effects All Action Alternatives

Approximately 297 acres of commercial thinning and 6,260 acres prescribed burning have been authorized within the project area under signed decisions. The effects of commercial thinning of vegetation as described in this project would be additive to these authorized activities. The effects of the commercial thinning would be similar to those discussed above for timber management. The effects of prescribed burning could be positive and/or negative depending upon whether or not individual bats are within the project area at the time of the prescribed burn. It is possible that prescribed burning during the growing season could result in direct mortality if actual roost trees are incinerated or if the bats encounter smoke inhalation. Positive indirect effects would be expected to occur through reducing forest clutter and allowing for more open flyways. The commercial thinning and prescribed burning have previously been analyzed for the NLEB and are consistent with the 4(d) rule issued for this species. The proposed project and other projects planned in the foreseeable future would not provide any cumulative long-term negative impacts to the NLEB or its habitat.

Bachman's sparrow - sensitive

Direct and Indirect Effects

No Action

The no action alternative would not have any direct effects upon the Bachman's sparrow. The positive indirect effects that would occur within the Proposed Action would not occur under this alternative. There would be no forest structure manipulation and no increase in quality habitat.

The forest would continue its natural succession into mature forest and continue growth into an already crowded condition. There would be no increase in herbaceous understory vegetation required by the Bachman's sparrow.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction),* ***Road/Fireline Construction, Wildlife Pond Construction, and Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks)***

No direct effects to Bachman's sparrows would occur from implementation of the commercial thinning, clearcutting, group selection, seedtree, timber stand improvement, hand planting of shortleaf pine, road construction/relocation, temporary road construction, fireline construction, mechanical midstory removal, and mechanical removal of vegetation along existing roads. The habitat within the stands proposed for these activities is not suitable for Bachman's sparrows due to a high tree density and low level of herbaceous ground cover. Habitat for this species would occur after implementation of these vegetation management activities and thus direct impacts may occur during mechanical site preparation, timber stand improvement, and pond construction should these activities occur between April and July. Nests, eggs, and young birds still in the nest could be directly impacted through felling of a tree that contains a nest. Adult birds would not be at risk because they are mobile and would be expected to escape unharmed.

Positive indirect effects from the proposed timber harvests, timber harvest connected activities, and midstory reduction through decreasing the tree density and increasing the amount of grasses, forbs, and herbaceous vegetation that occurs in the understory. Masters and Wilson (1994) found that Bachman's sparrows were negatively related to percent canopy cover, midstory foliage, oaks > 3 inches diameter at breast height, and tree diversity. Pine stands managed by thinning and midstory removal promotes an increase in herbaceous material growth (Masters & Wilson, 1994), which would provide increased nesting opportunities and a greater abundance of Bachman's sparrows (Wood, Burger Jr, Bowman, & Hardy, 2004). Haggerty (1996), Plentovich et al (1998), Haggerty (2000), and Wood et al (2004) found that management practices that reduce litter, maintain relatively low tree and shrub densities, and that encourage the growth of forbs and grasses are recommended for improving Bachman's sparrow habitat. Conner et al (2002) found that managed pine sites generally supported more abundant and species rich bird populations than mature forest control sites, with a specific increase in abundance for the Bachman's sparrow. Conner et al (2005) found that during an 8-year stretch in which forest management was prohibited by court injunctions in Texas, Bachman's sparrow abundance decreased significantly. Habitat requirements of this species are very specific and consist of woodlands with a well-developed herbaceous and grass layer with limited shrub and midstory components. The proposed projects would provide this type of habitat.

Bluebird Nestboxes and Erosion Control/Pollinator Habitat Seeding

No direct or indirect effects would occur from placement of bluebird nest boxes and seeding of areas where vegetation has been mechanically removed.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Direct effects of herbicide application on birds or nests with eggs are not likely because the primary target in these applications would be hardwood brush cut surfaces (stumps or girdle furrows). Much of this would occur in thicker, unsuitable habitat. Neither hardwood brush nor dense stands are preferred nesting habitat due to a lack of grass and herbaceous plants important for nest construction and concealment. Adults and fledglings are highly mobile and would not be directly impacted.

SUMMARY OF LD50 VALUES FOR BIRD SPECIES (TABLE 3.14)

Active Ingredient	LD_{50}*	Toxicity Risk to Bobwhite and or Mallard	Risk Assessment
Glyphosate	>540mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>2150 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2004d
Imazapyr	>2510 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011b
Triclopyr	>116 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011d

LD_{50}*: lethal dose for 50% of population tested

No Herbicide Use

The no herbicide alternative would have an overall no effect on the forest-wide trends for this bird species. The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The effects of this alternative would be similar to the proposed action. Thinning/group selection would have similar effects as seedtree harvests.

Shaded Fuel Breaks

The effects of this alternative would be similar to the proposed action.

Cumulative Effects All Action Alternatives

The effects of the Rock Creek Timber Project would be similar to those discussed above for timber management. The effects of the Broken Bow Unit Prescribed Burning Project could be positive and/or negative depending upon whether or not individual birds/nests/eggs are within the project area at the time of the prescribed burn. It is possible that prescribed burning could result in destruction of nests/eggs and/or direct mortality to young in the nest. Positive indirect effects would be expected to occur through increasing the amount of herbaceous vegetation and thus increasing suitable nesting/foraging habitat for this species. The proposed project and other projects planned in the foreseeable future would not provide any cumulative long-term negative impacts to the bachman's sparrow or its habitat.

Dianna fritillary - sensitive

Direct and Indirect Effects

No Action

The no action alternative would have no direct or cumulative effects on the Diana fritillary. Negative indirect effects would occur through implementation of the no action alternative. Because no forest structure manipulation would occur, these stands would continue growth into an already crowded condition. There would be no increase in nectar sources, thus causing a continued decline of suitable habitat for the Diana fritillary.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction),* ***Road/Fireline Construction, Wildlife Pond Construction, Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks), and Erosion Control/Pollinator Habitat Improvement Seeding***

Direct effects are possible to Diana fritillaries during harvest treatments, site preparation, midstory reduction, timber stand improvement, pond construction, mechanical removal of vegetation along existing roads, fireline construction, and road construction/relocation. Diana fritillary females lay their eggs on violets and the larvae appear in the spring and feed on the host plant. The removal of trees by any method has the potential to damage or destroy the eggs and/or larvae of this species. The eggs and/or larvae could have a tree fallen directly on them or be run over by logging equipment.

The proposed project would be expected to provide a positive indirect benefit to Diana fritillaries through a change in vegetative composition and quantity. Campbell et al (2007) suggested that vegetation management, which results in increased herbaceous plant cover, results in a higher abundance of Diana fritillaries due to increased nectar source production. The proposed clearcutting, which would occur in pine plantations that presently provide very little suitable habitat, would provide an enormous increase in nectar sources. Similar positive effects would occur within the areas proposed for seedtree harvest. Rudolph and Ely (2000b) found that managed loblolly and shortleaf pine forests supported more individual butterfly species and wider taxonomic array than unmanaged forests. This is due to the increased flower/nectar source abundance in these pine stands which were vegetatively manipulated. This study used midstory basal area as one of the habitat variables and showed that the lowest midstory basal areas occurred within the loblolly and shortleaf pine areas. Thus, this study indicated that timber harvest, midstory removal, and prescribed burning positively influenced the habitat conditions for butterfly species. Rudolph and Ely (2000a) found that in southwestern Arkansas, a large majority of the species found there prefer habitats that allow more sunlight to reach the ground because these species are responding to the increased availability of nectar resources in these areas. Diana fritillaries were significantly more abundant in restored stands than control stands, apparently responding to the increased abundance of high quality nectar sources (Thill, Rudolph, & Koerth, 2004) (Rudolph, Ely, Schaefer, Williamson, & Thill, 2006).

Observations of the Diana fritillary during their study suggest that managed pine habitat is the principle habitat used by adults. Rudolph (pers. Comm) indicated that Diana fritillaries are fairly common in pine restoration areas and are essentially non-existent in control sites with lots of hardwood midstory. Spencer (pers. Comm..) indicated that in five years of Diana fritillary surveys (2000-2005), these surveys have shown that the adult Dianas are positively impacted by pine restoration activities because the forested area becomes more open, more light hits the ground, and more high-quality nectar plants are available for the butterflies (short term basis).

Slightly negative indirect effects may occur from the proposed temporary road and fireline construction. These areas would be revegetated after use with a native grass mixture. This mixture does not provide for any nectar producing plants and although the area would be vegetated, it would not be vegetated to a seed mix useable by Diana fritillaries. However, if a native wildflower seed mixture is used, that would be beneficial to this species by providing increased pollinator sources. This would be the case for the seeding of the areas removed by mechanical methods along Forest Service roads as native wildflowers are proposed to be reseeded in these areas.

Bluebird Nestboxes

No direct or indirect effects would occur from placement of bluebird nest boxes.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

The following herbicide active ingredients for site preparation, timber stand improvement, and midstory reduction are being proposed: glyphosate, imazapic, imazapyr, and triclopyr. Given the great diversity of species of terrestrial invertebrates, the use of data from a single species (Bee – Apis mollifera) for the risk characterization obviously leads to uncertainty in the risk assessment. However, given the preponderance of scientific studies available this information is applicable and represents the best science resource to date.

Bioassay studies of the listed chemicals proposed for use in the project area all exhibit very low toxicity to invertebrate species (bees). These determinations were based on concentrations of herbicides applied to bees that would far exceed concentrations applied in field treatment applications. Given the low risk of toxicity exhibited in invertebrate testing no direct impact to Diana fritillary is anticipated. Indirect effect of herbicide application would most likely come in the temporary loss of some woody shrubs, and annual, and perennial broadleaf herbaceous plant species that provide shelter and food sources (nectar) for this butterfly species. While some butterfly habitats may be impacted by the treatment activities, maintaining or expanding suitable habitat would be "beneficial" for the species in the long-term.

SUMMARY OF LD50 VALUES FOR BEE (TABLE 3.15)

Active Ingredient	LD50*	Toxicity Risk to Bee – Apis mollifera	Risk Assessment
Glyphosate	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	No LD50 stated	Nontoxic	Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	>860 mg/kg body weight**	Nontoxic	Syracuse Environmental Research Associates, Inc. 2011b
Triclopyr	620mg/kg body weight	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011c

LD50* - lethal dose for 50% of population tested
NOAEL** - the highest tested dose or concentration of a chemical or agent, at which no such adverse effect is found in exposed test organisms where higher doses or concentrations resulted in an adverse effect.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The effects of this alternative would be similar to the proposed action except that there might be a reduced amount of nectar producing plants due to a reduction in the creation of early seral habitat.

Shaded Fuel Breaks

The effects of this alternative would be similar to the proposed action.

Cumulative Effects All Action Alternatives

The effects of the Rock Creek Timber Project would be similar to those discussed above for timber management. The effects of the Broken Bow Unit Prescribed Burning Project could be positive and/or negative depending upon whether or not individual butterflies/larvae are within the project area at the time of the prescribed burn. It is possible that prescribed burning could result in direct mortality to adult butterflies and/or larvae. Positive indirect effects would be expected to occur through increasing the amount of herbaceous vegetation, including nectar sources. The proposed project and other projects planned in the foreseeable future would not provide any cumulative long-term negative impacts to the diana fritillary or its habitat.

Ouachita leadplant, Waterfall's sedge, Pineoak jewelflower - sensitive

Direct and Indirect Effects

No Action

The no action alternative would not have any direct or indirect effects upon these plant species. This alternative would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these species and their associated habitats. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally, and to which these species are adapted. No direct or indirect effects on these sensitive plant species would occur as a result of deferred management.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction),* ***Road/Fireline Construction, Wildlife Pond Construction, and Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks)***

Direct effects are possible to these species from timber harvest, timber stand improvement, mechanical site preparation, midstory reduction, fireline construction, mechanical removal of vegetation along roads, wildlife pond construction, and road construction/relocation because if individual plants are within these areas, they may have trees directly felled on them or be damaged/destroyed from equipment. The majority of plants that would get damaged during timber harvest from trees or logging equipment would be expected to remain alive because very rarely would these activities pull the plant completely from the ground. However, the possibility does exist for individual plants to be completely destroyed, especially from road construction and waterhole/fireline construction should individuals be in the immediate path of the project.

Standards and guidelines for streamside management areas would be in place to protect the Ouachita leadplant, the one species that is highly dependent on riparian zones. This includes a minimum 30-foot buffer around all streams with a defined channel at least one foot wide and three inches deep, and a minimum 100-foot buffer around all perennial streams.

Indirect effects may occur through altering the vegetative composition. In most cases, this would be expected to be a positive short-term effect through increasing the amount of sunlight reaching the forest floor. This would allow increased growth opportunities in the short-term. However, in the case of Waterfall's sedge, this species does best in areas of little understory and ground cover. An increase in ground level vegetation would be expected to occur within the mature pine stands because timber harvest and associated activities will cause an increase in herbaceous vegetation. This has the potential to decrease suitable habitat in the long-term within these areas, though the new growth of herbaceous vegetation would not be expected to totally outcompete Waterfall's sedge.

Bluebird Nestboxes and Erosion Control/Pollinator Habitat Seeding

No direct or indirect effects would occur from placement of bluebird nest boxes and seeding of areas where vegetation has been mechanically removed.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Herbicide application could provide direct effects to these sensitive plant species as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities. The chance of this occurring is highly unlikely because the herbicide applications are stem specific for the trees planned for treatment. Indirect effects would be reduced competition for resources from control of encroaching vegetation.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The effects of this alternative would be similar to the proposed action.

Shaded Fuel Breaks

The effects of this alternative would be similar to the proposed action.

Cumulative Effects All Action Alternatives

The effects of the Rock Creek Timber Project would be similar to those discussed above for timber management. The effects of the Broken Bow Unit Prescribed Burning Project could be positive and/or negative. It is possible that prescribed burning could result in destruction of individual plants through the burn getting too hot and killing the root system. Positive indirect effects would be expected to occur through altering the existing vegetation composition. Prescribed burning would be expected to improve and increase growth of grasses, forbs, and other ground-level plants. In most cases, this would be expected to improve habitat through reducing short-term competition for sunlight, moisture, and space. The proposed project and other projects planned in the foreseeable future would not provide any cumulative long-term negative impacts to these plants species or their habitat.

<u>Ozark chinquapin – sensitive</u>

Direct and Indirect Effects

No Action

The no action alternative would not have any direct or indirect effects upon these plant species. This alternative would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these species and their associated habitats. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally, and to which these species are adapted. No direct or indirect effects on these sensitive plant species would occur as a result of deferred management.

Proposed Action

Timber and Silvicultural Activities (*clearcut, group selection, seedtree, commercial thinning, site preparation, timber stand improvement, hand planting of shortleaf pine seedlings, and midstory reduction),* ***Road/Fireline Construction, Wildlife Pond Construction, and Mechanical Removal of Vegetation Along Forest Service Roads (Fuelbreaks)***

Should Ozark chinquapin occur within the proposed project area, direct effects would be possible from timber harvest, timber stand improvement, midstory reduction, mechanical site preparation, road construction, fireline construction, and mechanical removal of vegetation along roads. Individual trees individual stems may have trees directly felled on them or be damaged/destroyed from equipment. The majority of plants that would get damaged during timber harvest from trees or logging equipment would be expected to remain alive because very rarely would these activities destroy the entire tree or root system. The possibility does exist for individual stems to be completely destroyed, especially from temporary road construction and waterhole/fireline construction should individuals be in the immediate path of the project.

Indirect effects to Ozark chinquapin may occur from the proposed project. Timber harvest (all methods) would be expected to promote the viability of Ozark chinquapin due to the admittance of more light to plants that often survive in the form of suppressed sprouts. Timber harvest may result in rapid release of chinquapin sprouts or roots that may have been dormant for many years. The reduction of competition may provide increased growing spaces for new stems should mature, seed-producing individuals occur within the proposed project areas.

Bluebird Nestboxes and Erosion Control/Pollinator Habitat Seeding

No direct or indirect effects would occur from placement of bluebird nest boxes and seeding of areas where vegetation has been mechanically removed.

Herbicide Treatments (*chemical site preparation, chemical timber stand improvement, chemical midstory reduction*)

Herbicide application could provide direct effects to this species as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities. Indirect effects would be reduced competition for resources from control of encroaching vegetation.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Uneven Aged Management

The effects of this alternative would be similar to the proposed action.

Shaded Fuel Breaks

The effects of this alternative would be similar to the proposed action.

Cumulative Effects All Action Alternatives

The effects of the Rock Creek Timber Project would be similar to those discussed above for timber management. The effects of the Broken Bow Unit Prescribed Burning Project could be positive and/or negative. It is possible that prescribed burning could result in destruction of individual plants through the burn getting too hot and killing the root system. However, this species is a prolific resprouter and resprouting is thought to rejuvenate the root collar and thereby promote existence of the species across generations. Positive indirect effects would be expected to occur through altering the existing vegetation composition. Prescribed burning would be expected to improve and increase growth of grasses, forbs, and other ground-level plants. In most cases, this would be expected to improve habitat through reducing short-term competition for sunlight, moisture, and space. The proposed project and other projects planned in the foreseeable future would not provide any cumulative long-term negative impacts to Ozark chinquapin or its habitat.

Local Economy & Financial Efficiency

Present Conditions

The Hochatown Wildland Urban Interface Vegetation Management Project is located in McCurtain County, Oklahoma. As of 2016, the populations of this county was 32,822 (Headwaters Economics, 2018).

The following table displays the percentage of the county land base occupied by National Forest System lands. It also displays employment in commodity sectors of the economy that have the potential to use federal public lands, as well as employment in travel and tourism sectors that provides goods and services to forest visitors (Headwaters Economics, 2018).

NFS LAND BASE AND RELATED JOBS OF COUNTY REGION (TABLE 3.16)

Indicator	Geography McCurtain
% Land Base	
NFS Lands	10.3%
% Total Jobs	
Timber	13.0%
Mining[1]	0.5%
Agriculture	9.2%
Travel & Tourism	13.1%

1-Unrelated to fossil fuels

No Action

Direct, Indirect and Cumulative Effects

The federal government would not provide additional resources to stimulate economic growth.

No additional employment in the timber industry would occur, nor would potentially available intermediate age and maturing trees contribute to maintaining timber related jobs that already exist.

The goals and objectives of the Forest Plan would not be met.

All Action Alternatives

Direct, Indirect and Cumulative Effects

Many management actions are performed by contractors (site preparation, stand improvement, road construction etc.). These activities would provide jobs to the local community and create a stream of revenue to local businesses. These effects would be additive to ongoing Forest Service contracts located within the project counties.

Project Financial Efficiency

Under the Proposed Action and the No Herbicide Alternative there would be both costs and revenues associated with the sale of timber. Costs include activities that are directly associated with timber management (site preparation, timber sale administration, etc.). Revenues are generated from the sale of timber. A computer program called Quick Silver version was used to evaluate the financial efficiency of each alternative; these results are displayed in the table below.

ALTERNATIVE COMPARISON BY FINANCIAL EFFICIENCY (TABLE 3.17)

Financial Indicator	No Action	Proposed Action/ Shaded Fuels Breaks	No Herbicide	Uneven Aged Management
Present Value of Revenues[1]	0	$1,937,537	$1,937,537	$1,948,563
Present Value of Costs[2]	0	($901,762)	($958,897)	($971,975)
Present Net Value[3]	0	$1,035,775	$978,640	$976,588
Revenue/Cost Ratio[4]	N/A	2.15	2.02	2.00

1- Present Value of Revenues – The sum of all revenues discounted at some interest rate.
2- Present Value of Costs – The sum of all costs discounted at some interest rate.
3- Net Present Value – The sum of the present value of the revenues minus the sum of the present value of the costs.
4- Revenue/Cost Ratio – Present value of revenues divided by the present value of costs.

The Benefit/Cost Ratio is highest for the Proposed Action and the Shaded Fuels Breaks Alternative.

Public Health & Safety

Present Conditions

Refer to the present conditions described in the Air Quality section and the Water Resources & Quality section of this chapter.

No Action

Direct and Indirect Effects

The application of herbicides would not take place under this alternative; there would be no effect to public health and safety specific to this activity.

Cumulative effects

There are no actions proposed under this alternative, so there would be no cumulative effects on this resource.

Proposed Action, Uneven Aged Management, Shaded Fuels Breaks

Direct and Indirect Effects

Refer to the Air Quality section of this chapter for disclosure of effects on public health and safety.

Accidents or other unforeseen events might occur during herbicide transportation, mixing, and application. Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides, which would eliminate the risk entirely. These include posting warning signs on areas that have been treated; selectively targeting vegetation that needs to be controlled rather than using broadcast application; establishing buffer zones of non-treatment around private property, streams, roads, and hiking trails; carefully transporting only enough herbicide for one day's use; mixing it on site away from private land, open water, or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident pre-planning and emergency spill plans in place. Enforcement and administration will be effective in reducing the risk of accidental contamination to humans or the environment. In the event of an accidental spill, the Emergency Spill Plan (Forest Service Manual 2109 Chapter 30) would be followed. The Plan contains procedures for spill containment and cordoning-off of the spill area. These measures along with others given in the Revised Forest Plan are incorporated into contracts and through good enforcement and administration would be effective in reducing the risk of accidental contamination of humans or the environment.

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or

aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a significant threat to human health or aquatic organisms.

Syracuse Environmental Research Associates Incorporated (SERA) Human Health and Ecological Risk Assessments were used to analyze the risks associated with the herbicides proposed for treatment. Site-specific risk assessments developed by SERA have been conducted for this project as required by the Revised Forest Plan (p. 87, HU002) and are located in the project file.

Estimates of risk are presented in terms of a hazard quotient (HQ). An HQ is the quotient of an estimate of exposure divided by the appropriate toxicity value. Concern for the development of adverse effects increases as the value of the HQ increases.

Glyphosate may be used at an application rate of 2 lbs/acre. It would generally be applied as a foliar application to weeds and woody brush. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: water consumption by a child after an accidental spill, and consumption of contaminated vegetation by an adult female.

Imazapic may be used at an application rate of 0.188 lb/acre. It would generally be applied as a foliar application to weeds. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios except for water consumption by a child after an accidental spill.

Imazapyr may be used at an application rate of 1.5 lb/acre. It would generally be applied as a foliar application to weeds and brush species. At this rate, the risk assessments indicate the use of imazapyr does not pose any identifiable hazard to workers or the general public in Forest Service applications. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios.

Triclopyr triethylamine (salt) may be applied at a rate of 4 lbs/acre for cut-surface treatments; triclopyr butoxyethyl (ester) may be applied at a rate of 2 lbs/acre for foliar spray. Triclopyr is used to control herbaceous and woody broadleaf weeds.

At the central and upper bounds of the estimated exposures for workers using a backpack sprayer application method, the hazard quotients for both triclopyr amine and triclopyr ester formulations exceed the level of concern, ranging from 1 to 12. The level of concern is also exceeded for accidental exposure to contaminated gloves for one hour at the central and upper bounds of exposure to triclopyr ester.

For the general public, several exposure scenarios exceed the level of concern. Hazard quotients for direct spray of a child's whole body and direct spray to the feet and lower legs of an adult female range from 1.4 to 3. For an adult female consuming contaminated vegetation, the upper bound HQ is 108 for acute exposures and 26 for longer-term exposures. In addition, some of the central estimates of exposure to triclopyr involving a young woman consuming contaminated vegetation or fruit also exceed the level of concern. Because triclopyr has been shown to cause

adverse developmental effects in mammals, high HQs associated with terrestrial applications are of particular concern in terms of the potential for adverse reproductive outcomes in humans. Adverse developmental effects in experimental mammals have been observed, however, only at doses that cause frank signs of maternal toxicity. The available toxicity studies suggest that overt and severe toxicity would not be associated with any of the HQs and this diminishes concern for reproductive effects in humans (SERA, 2011d).

Cumulative Effects

There are no other past, present or reasonably foreseeable future applications of herbicide within the project vicinity that would be additive to the effects of this project.

No Herbicide Use

Since no herbicides would be utilized under this alternative, there would be no direct, indirect, or cumulative effects on public health and safety resulting from herbicide use.

Recreation & Scenic Resources

Recreation Resource

Present Conditions

The project area contains, or is in close proximity to, several features important to recreation resources. The eastern boundaries are shared with Beavers Bend State Park and Hochatown State Park, operated by the Oklahoma Tourism and Recreation Department. In the western boundary of Beaver's Bend State Park, the Skyline Trail crosses from State Park lands onto Forest Service System Lands, and serves the general public that utilize this recreation resource that visit Beaver's Bend State Park and the surrounding area. The project area also contains FS roads that are associated with OHV activities, and listed on the MVUM map for the Forest, additional roads in the project area that could be affected are state Highway 259A, which serves access and egress from Beaver's Bend State Park and other access roads to Hochatown State Park.

The Recreation Opportunity Spectrum (ROS) for the project area is 98% ROADED NATURAL with 2% of the project area adjacent to both State Parks falling into the RURAL class. The closest NF wilderness is Upper Kiamichi, approximately 32 miles north. The nearest river eligible for consideration as a component for the National System of Wild and Scenic Rivers is a Scenic River segment of the Glover, approximately eight miles west of the project area. The closest inventoried roadless area is Beech Creek, 25 miles to the north.

No Action

Direct and Indirect Effects

The results of no action being taken would have no direct effects to Beavers Bend State Park or Hochatown State Park. There would be no effects on recreational users.

Cumulative effects

There are no actions proposed under this alternative, so there would be no cumulative effects on this resource.

Proposed Action

Direct and Indirect Effects

Immediate effects to the recreation resource would include a disturbance in the recreation experience by the sights, sounds, and smells of management activities such as logging operations and fuel break construction. Noise from logging and road construction, as well as increased dust, would be a temporary disturbance while management activities are being performed. Regeneration harvests and thinning operations could result in increased wildlife viewing and hunting opportunities.

Proposed site preparation would result in a loss of midstory and understory vegetative screening, and produce slash on the forest floor. This action could result in an impact to the trail tread or trail path due skidding across, on, or adjacent to the trail tread.

The loss of over story canopy along the trail could affect trail maintenance over the long term, by increasing sunlight variances which in turn would produce more brush and small tree re-generation, and thus give the trail path more brush and scrub like appearance. This effect would only be temporary until seed trees reach mature growth, and the use of prescribed fire would help minimize the impact of brush and scrub along the trail.

Cumulative effects

There are no other past, present or reasonably foreseeable future actions along the trail or within the project area that would be additive to the effects of this project.

No Herbicide Use

The effects of this alternative would be the same as those attributed to the Proposed Action above.

Uneven Aged Management

Direct and Indirect Effects

The effects of this alternative would be the same as those attributed to the Proposed Action above, however, only a small section of the trail would be affected under this Alternative. Even though only a small section of the trail would be affected at a given time, the trail would be affected over a longer period of time; smaller sections along the trail path would be affected during the span of several years of active work.

Cumulative Effects

There are no other past, present or reasonably foreseeable future actions along the trail or within the project area that would be additive to the effects of this project.

Shaded Fuel Breaks

The effects of this alternative would be the same as those attributed to the Proposed Action Alternative above.

Scenic Resource

Present Conditions

The existing landscape character for the project area, and its regional surroundings, consists of moderate to strongly rolling hills and lower elevation mountains with long low ridges interspersed by narrow valleys positioned in an east-west trending direction. Elevations generally range from 450-1,000 feet. The majority of slopes in the area are less than 15% grade.

The fairly dense forested slopes of oak-hickory-pine communities can be highly visible from valley bottoms. Some of the valley and sloped lands are privately owned and are developed as vacation homes, cabin rentals, some small rural communities, and a rapidly growing commercial sector. Dense natural vegetation along ditches or vacant land creates an enclosed agricultural patchwork that limits middle-ground views. Once within the forest; vegetation density prevents most views beyond the immediate foreground, and no views are panoramic except where formal viewpoints have been established.

The vegetation cover is composed of a variety of species. Shortleaf pine and shortleaf pine-oak-hickory forests dominant the uplands while the hardwood forests tend to dominant the drainages and riparian areas. There are, however, some upland hardwood-dominated stands scattered throughout the project area, especially on those slopes with northern exposure.

Natural disturbance factors of wind, ice storms, droughts, wildfire, and insect or disease cycles have played a strong part in shaping the vegetation mosaic of the landscape. A viewer of the forest in the Hochatown area several hundred years ago would most likely have seen open to very open upland forests dominated by short leaf pine and hardwoods (mostly oak) in varying proportions. Riparian areas, sheltered coves and other mesic areas would tend toward hardwood dominance in multi-storied, very mixed species stands, with denser hardwood understories.

With European settlement, fire activity declined and the forest's understory redeveloped rapidly. Most of the area was entered for timber harvest, and most of the larger, older trees removed. The shortleaf pine forests no longer are open or support the grass and forb understory which they were characterized as having in earlier times. In addition, the forests are generally more closed and less biologically diverse than the open pine and oak woodlands of years ago.

In recent decades, the vegetation management practices of private and public land agencies has introduced significant negative deviations to the characteristic landscape. Vast timber sale activities and the lack of a proper prescribed burning program have resulted in large acreages no longer resembling the expected landscape character for the region.

The scenic resource is comprised of the attributes, characteristics, and features of a landscape that provide varying responses from and benefits to humans. Scenic integrity is made up of the essential attributes of the landscape that, when viewed by humans, invokes physiological and psychological benefits to individuals and; therefore, to society in general.

Scenic Integrity Objective (SIO) levels, referring to the degree of acceptable alterations to landscape character, include high (62%), medium (29%) and low (9%) across the project area.

Direct and Indirect Effects

No Action

No management actions are proposed; this alternative would not alter scenic integrity. Changes in the landscape would continue to appear natural to the observer.

Proposed Action

Direct effects to the scenic resource would occur largely in the form of changes in forest vegetation resulting from vegetation management; proposed timber harvest, site preparation, timber stand improvement, midstory reduction, overstory mast development, and fuels reduction. These management activities would result in more visible middleground due to a reduction in density of the midstory and understory vegetation. An indirect effect of vegetation management activity would be enhanced viewing depth and a contrasting variety in tree density. Many of these activities would also result in a direct effect of logging or thinning residue, such as treetops and branches, accumulating on the ground. This residue would eventually decay and reduce the contrasting effect to scenic integrity over the long-term.

Travel-ways are generally dominated by a limited view of the forest due to some vehicle speed carrying the observer. Trail users on foot, horseback, or off-road vehicles have more time to experience views into the forest. Beneficial scenery enhancement would result from the indirect effects of vegetation management along roads and trails. Log-landing sites are associated with travel-ways and always add a direct negative effect unless they are located beyond the visible area of a travel corridor. Changes in color and texture will result from exposed soil in newly contructed roads and skid trails; however this indirect effect should be short-term as expected revegetation occurs from natural conditions and/or restoration measures.

Proposed stand improvement would result in a short-term direct effect on scenic integrity as the residue becomes brown as part of the decaying process. Over time the scenic integrity would be enhanced as the residue decay continues, or the residue is covered over by the greenery of new growth from the forest floor.

Proposed seed tree, or modified seed tree, regeneration harvests would create a visible linear edge along the surrounding forest. In general, this treatment does not meet the SIO of HIGH. Namely, seed tree operations proposed for portions of units 1841-17, 1841-21, 1841-22, 1842-8, 1877-11, 1877-21, 1877-22, 1877-24, 1877-25, 1877-47 would not meet the SIO of HIGH.

However, this alternative meets Revised Forest Plan MA16 SIO requirements, in that management actions meet high SIO in first one-fourth mile and seen area from the lake surface; only group selection harvest is proposed in these areas.

The number of trees removed from a typical thinning usually creates a minimal change in the forest form. Few, if any, linear edges will occur. Pine needles in slash turn a distinctive red-orange color and the wood becomes gray. Hardwood slash does not change color, but tends to be noticeable in early spring and in late fall. Understory vegetation helps screen slash from view.

Proposed site preparation with the use of herbicides would result in a loss of mid-story and understory vegetative screening, and produce slash on the forest floor. Because these activities target hardwoods, a loss of spring and fall colors would be evident. Although the application of herbicides may coincide with the seasonal browning of leaves in autumn, standing dead vegetation may be evident for two or three years after application since standing dead wood takes longer to decompose and leaves that experience sudden death become brown but do not fall as quickly as leaves that turn color and drop naturally in the fall.

Changes in color and texture would result from exposed soil in roads, skid trails, and fire lines.

The corridor viewshed for each of the Forest Service system roads would be altered under the 30'/15'/30' fuel break guideline. but the alterations should stay within SIO limitations using the stated design guidelines. The 15'/30' fuel break guideline along national forest boundary lines would have a direct effect of altering the natural "backyard appearance" from adjacent private cabins, residences, and to a lesser degree, commerical property and the neighboring lands of the State Park and Corps of Engineers. When implementing the recommended design guidelines, these alterations should stay within SIO limitations.

No Herbicide Use

The direct and indirect effects would be similar to the Proposed Action but for the following considerations:

Proposed site preparation with the use of mechanics instead of herbicides would result in a similar loss of mid-story and understory vegetative screening, and produce slash on the forest floor. As mentioned earlier, these activities target hardwoods and a similar loss of spring and fall colors would be evident. Mechanical site preparation will have a similar scenic effect as the application of herbicides, but may be evident for only one to maybe two years after application since dead and down wood and leaves touching soil will decompose and disappear quicker than standing dead wood.

This alternative would not meet the SIO in the same areas stated in the previous alternative. It would meet MA16 SIO requirements. The effects of the fuel break guidelines would also be the same.

Uneven Aged Management

The direct and indirect effects for this alternative would have some significant differences when compared to the effects outlined in the Proposed Action:

Unlike the earlier alternatives, management actions proposed under this alternative would have a lower level of altering effects to the scenic integrity of the characteristic landscape. Site preparation and fuels management, particularly around cabins and residences, would be similar as described in earlier alternatives, but changes in the management of mid-story and over-story vegetation of the characteristic landscape here would result in introducing pockets of viewing depth without losing as much of the canopy cover. Vegetation management actions along travel corridors and adjacent to private land holdings would mostly continue to appear natural to the observer. This alternative has potential of meeting all of the SIOs for the project area. Only the no action alternative would be more natural appearing over this one.

Shaded Fuel Breaks

The direct and indirect effects would be similar to the Proposed Action but for the following considerations:

Management actions proposed under this alternative would have a lower level of altering effects to the scenic integrity of the characteristic landscape when compared to the Proposed Action and the No Herbicide Use Alternative, but not as low as the Uneven Aged Management Alternative. Site preparation and fuels management, particularly around cabins and residences, would be similar as described in earlier alternatives, but changes in the management of mid-story and over-story vegetation of the characteristic landscape here would result in introduction of a light, but continuous forest canopy instead of having various locations of open-air fuel breaks in areas where cabins and residences exist adjacent to national forest boundaries. These changes in forest vegetation would result in more visible park-like middle ground due to a reduction in density of the mid-story and understory vegetation. An indirect effect of this vegetation management activity would be enhanced viewing depth, but with a lack of contrasting variety in tree density. Like the Proposed Action, the seed-tree treatments listed would not meet the SIO of HIGH. It would meet MA16 SIO requirements.

The 100’/30’/20’ shaded fuel break guideline along national forest boundary lines would still have a direct effect of altering the natural “backyard appearance” from adjacent private cabins and residences, but the impact would be reduced significantly compared to previous alternatives.

Cumulative Effects

The following projects would contribute additive effects to scenic quality as described above: Approximately 384 acres of commercial thinning and 6,260 acres of prescribed burning have been authorized within the project area under signed decisions in 2015 (West Mountain Fork EA), 2016 (Broken Bow Burn EA), and 2017 (Rock Creek Timber EA).

Climate Change

Effects of proposed actions on climate change

Forests play a major role in the global carbon cycle by storing carbon in live plant biomass (approximately 50% of dry plant biomass is carbon), in dead plant material and in soils. Forests contain three-fourths of all plant biomass on earth, and nearly half of all soil carbon. The amount stored represents the balance between absorbing CO_2 from the atmosphere in the process of photosynthesis and releasing carbon into the atmosphere through live plant respiration, decomposition of dead organic matter, and burning of biomass (Krankina & Harmon, 2006).

Through the process of photosynthesis, carbon is removed from the atmospheric pool. About half the carbon absorbed through photosynthesis is later released by plants through respiration as they use their own energy to grow. The rest is either stored in the plant, transferred to the soil where it may persist for a very long time in the form of organic matter, or transported through the food chain to support other forms of terrestrial life. When plants die and decompose, or when biomass or its ancient remains in the form of fossil fuels are burned, the original captured and stored carbon is released back to the atmosphere as CO_2 and other carbon-based gases. In addition, when forests or other terrestrial ecosystems are disturbed through harvesting, conversion, or natural events such as fires, some of the carbon stored in the soils and organic matter, such as stumps, snags, and slash, is oxidized and released back to the atmospheric pool as CO_2. The amount released varies, depending on subsequent land use and probably rarely is more than 50% of the original soil store (Salwasser, 2006). As forests become older, the amount of carbon released through respiration and decay can exceed that taken up in photosynthesis, and the total accumulated carbon levels off. This situation becomes more likely as stands grow overly dense and lose vigor. Wildfires are the greatest cause of carbon release from forests. At the global scale, if more carbon is released than is captured and stored through photosynthesis or oceanic processes, the concentration of carbon dioxide (CO_2) builds in the atmospheric pool. However, the greatest changes in forest sequestration and storage over time have been due to changes in land use and land use cover, particularly from forest to agriculture and more recently changes are due to conversions from forest to urban development, dams, highways, and other infrastructure (Malmsheimer, Heffernan, & Brink, 2008).

No Action

Direct, Indirect and Cumulative Effects

The activities proposed during this entry would not occur; therefore no direct effects on greenhouse gases (GHG) emissions and carbon cycling would occur. Carbon would continue to be sequestered and stored in forest plants, trees, (biomass) and soil. There would be no cumulative effects under the no action alternative because no activities are proposed.

Proposed Action, No Herbicide, Uneven Aged, and Shaded Fuels Breaks

Direct and Indirect Effects

The proposed harvest operations would result in a release of carbon and reduce carbon storage in the forest both by removing organic matter (trees) and by increasing heterotrophic soil respiration. However, much of the carbon that is removed is offset by storage in forest products. Forest management that includes harvesting provides increased climate change mitigation benefits over time because wood-decay CO_2 emissions from wood products are delayed (Malmsheimer, Heffernan, & Brink, 2008). Prescribed burning activities, although a carbon neutral process, would release CO_2, other greenhouse gases, and particulates into the atmosphere. Indirectly, commercial thinning, which would reduce stand density, and regeneration harvests, which would result in younger forest, would reduce carbon accumulation in the atmosphere.

Cumulative Effects

As GHG emissions and carbon cycling are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with this project or any number of projects. It is not expected that the effects of this project or multiple projects can be specifically attributed the cumulative effects on global climate change.

Effects of Climate Change on the Proposed Project

For some management proposals, climate change may affect the project. For example: the effects of decreased snowfall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation. However, for this project, no direct, indirect, or cumulative effects from climate change on the proposal are anticipated.

Chapter 4
Persons and Agencies Consulted

Contributors

Robert Bastarache	Wildlife Biologist
Roger Coleman	Forest Archaeologist
Timothy Davis	Geographic Information System Technician
Dustin Flowers	Other Resources Assistant
William (Ty) Gripp	Assistant Fire Management Officer (Acting)
Brandon Hughes	Assistant Fire Management Officer
Ron Krupa	Landscape Architect (Contract)
Judy Logan	Region 8 Zone Air Resource Specialist
Keagan Lowey	Silviculture Technician
Krista Richardson-Cline	Archeologist
Alex Schwartz	Silviculturist
Don Seale	Forest Hydrologist
Michael Snow	Wildlife Technician
Kevin Wagner	Engineering Technician
Erick Warren	Timber Management Assistant
Kris Wilson	Fire Management Officer

Coordination

Oklahoma Forestry Services
National Wild Turkey Federation
Oklahoma Department of Wildlife Conservation
US Army Corps of Engineers
The Choctaw Nation of Oklahoma
Quail Forever
Oklahoma State University
Oklahoma Parks and Recreation – Beavers Bend and Hochatown State Parks
Oklahoma Department of Transportation
McCurtain County Commissioners

Consultation

The Chickasaw Nation
Caddo Nation
The Choctaw Nation of Oklahoma
The Osage Nation
Quapaw Tribe of Oklahoma
Wichita and Affiliated Tribes
State Historic Preservation Office
Oklahoma Archaeological Society
Oklahoma Natural Heritage Inventory

Chapter 5
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Appendices

(A) Activities List by Compartment and Stand
(B) Activities List Road Segment
(C) Project Maps

1. **Management Areas**
2.
    a. **Proposed Timber Harvest – Proposed Action**
    b. **Proposed Timber Harvest – Uneven Aged**
3.
    a. **Proposed Silvicultural Activities – Proposed Action**
    b. **Proposed Silvicultural Activities – No Herbicide**
    c. **Proposed Silvicultural Activities – Uneven Aged**
4.
    a. **Proposed Wildlife Activities – Proposed Action**
    b. **Proposed Wildlife Activities – No Herbicide**
    c. **Proposed Wildlife Activities – Uneven Aged**
5. **Proposed Fuels Treatments and Fire Line Activities**
6. **Proposed Transportation Activities**
7. **Proposed ROW Activities**
8. **Soil Concerns**
9. **Water Resources**
10. **Scenic Integrity Objectives**
11. **Conservation Lands Map**

Appendix A – Activities by Compartment and Stand by Alternative

The following tables list the specific actions proposed for each Forest compartment and stand by alternative, if applicable. All treatments are given in acres. Acreage values are estimates based on best available data; actual treated area may be revised to reflect more accurate field information and stand analysis.

PROPOSED ACTION & SHADED FUEL BREAK ALTERNATIVE													
Location			Proposed Activities										Management Area
Compartment	Stand	Acres	Seedtree	Clearcut	Commercial Thinning	Group Selection	Site Preparation (mechanical)	Site Preparation (chemical)	Hand Plant	Pre-commercial Thinning	TSI Release	WSI Midstory Removal	
			Treatment Acres										
1841	1	268	0	0	268	0	0	0	0	0	0	268	16
1841	2	18	0	0	18	0	0	0	0	0	0	18	16
1841	3	127	0	0	0	0	0	0	0	0	0	0	16
1841	4	529	0	0	529	0	0	0	0	0	0	529	16
1841	5	18	0	0	0	0	0	0	0	0	0	0	16
1841	6	37	37	0	0	0	37	0	0	37	37	0	16
1841	7	62	0	0	62	0	0	0	0	0	0	62	16
1841	8	26	0	0	26	0	0	0	0	0	0	26	16
1841	9	66	0	0	66	0	0	0	0	0	0	66	16
1841	10	141	0	0	141	0	0	0	0	0	0	141	16
1841	11	10	0	0	0	0	0	0	0	0	0	0	16
1841	12	37	0	0	37	0	0	0	0	0	0	37	16
1841	13	32	0	0	32	0	0	0	0	0	0	32	16
1841	14	15	0	0	15	0	0	0	0	0	0	15	16
1841	15	20	20	0	0	0	0	20	0	20	20	0	16
1841	16	21	21	0	0	0	0	21	0	21	21	0	16
1841	17	20	20	0	0	0	0	20	0	20	20	0	16
1841	18	20	20	0	0	0	0	20	0	20	20	0	16
1841	19	20	20	0	0	0	0	20	0	20	20	0	16
1841	20	47	0	0	0	0	0	0	0	0	0	0	16
1841	21	21	21	0	0	0	0	21	0	21	21	0	16
1841	22	20	20	0	0	0	0	20	0	20	20	0	16
1842	1	111	0	0	111	0	0	0	0	0	0	111	16
1842	2	37	0	0	0	0	0	0	0	0	0	0	16
1842	3	122	0	0	122	0	0	0	0	0	0	122	16
1842	4	130	0	0	0	0	0	0	0	0	0	0	16
1842	5	53	0	0	53	0	0	0	0	0	0	53	16
1842	6	109	0	0	109	0	0	0	0	0	0	109	16
1842	7	552	0	0	552	0	0	0	0	0	0	552	16
1842	8	111	0	0	111	0	0	0	0	0	0	111	16
1842	9	37	37	0	0	0	0	37	0	37	37	0	16

PROPOSED ACTION & SHADED FUEL BREAK ALTERNATIVE													
Location			**Proposed Activities**										**Management Area**
Compartment	**Stand**	**Acres**	**Seedtree**	**Clearcut**	**Commercial Thinning**	**Group Selection**	**Site Preparation (mechanical)**	**Site Preparation (chemical)**	**Hand Plant**	**Pre-commercial Thinning**	**TSI Release**	**WSI Midstory Removal**	
			Treatment Acres										
1842	10	72	0	0	72	0	0	0	0	0	0	72	16
1842	11	183	0	0	0	183	0	183	0	0	0	0	16
1842	12	26	0	0	26	0	0	0	0	0	0	26	16
1842	13	27	0	0	27	0	0	0	0	0	0	27	16
1842	14	208	0	0	208	0	0	0	0	0	0	208	16
1842	15	26	0	0	26	0	0	0	0	0	0	26	16
1842	16	27	0	0	27	0	0	0	0	0	0	27	16
1842	17	20	20	0	0	0	0	20	0	20	20	0	16
1842	18	20	20	0	0	0	0	20	0	20	20	0	16
1842	19	20	20	0	0	0	0	20	0	20	20	0	16
1842	20	20	20	0	0	0	0	20	0	20	20	0	16
1877	1	300	0	0	0	300	0	300	0	300	300	0	16
1877	2	751	0	0	751	0	0	0	0	0	0	751	16
1877	3	311	0	0	311	0	0	0	0	0	0	311	16
1877	4	413	0	0	413	0	0	0	0	0	0	413	16
1877	5	61	0	0	0	0	0	0	0	0	0	0	16
1877	6	103	0	0	103	0	0	0	0	0	0	103	16
1877	7	32	0	0	0	0	0	0	0	0	0	0	16
1877	8	122	0	0	122	0	0	0	0	0	0	122	16
1877	9	34	0	0	34	0	0	0	0	0	0	34	16
1877	10	12	0	0	12	0	0	0	0	0	0	12	16
1877	11	64	0	0	64	0	0	0	0	0	0	64	16
1877	12	43	0	0	43	0	0	0	0	0	0	43	16
1877	13	139	0	0	0	139	0	139	0	139	139	0	16
1877	14	17	0	0	0	0	0	0	0	0	0	0	16
1877	15	72	0	0	72	0	0	0	0	0	0	72	16
1877	16	13	0	0	0	0	0	0	0	0	0	0	16
1877	17	20	20	0	0	0	0	20	0	20	20	0	16
1877	18	56	0	56	0	0	0	56	56	0	0	0	16
1877	19	42	0	0	0	42	0	42	0	42	42	0	16
1877	20	20	20	0	0	0	0	20	0	20	20	0	16
1877	21	20	20	0	0	0	0	20	0	20	20	0	16
1877	22	21	21	0	0	0	0	21	0	21	21	0	16
1877	23	20	20	0	0	0	0	20	0	20	20	0	16
1877	24	20	20	0	0	0	0	20	0	20	20	0	16
1877	25	20	20	0	0	0	0	20	0	20	20	0	16
1877	26	20	20	0	0	0	0	20	0	20	20	0	16
1877	27	21	21	0	0	0	0	21	0	21	21	0	16
Total			481	56	4564	664	37	1163	56	1201	1201	4564	

NO HERBICIDE ALTERNATIVE													
Location			**Proposed Activity**										**Management Area**
Compartment	**Stand**	**Acres**	**Seedtree**	**Clearcut**	**Commercial Thinning**	**Group Selection**	**Site Preparation (mechanical)**	**Site Preparation (chemical)**	**Hand Plant**	**Pre-commercial Thinning**	**TSI Release**	**WSI Midstory Removal**	
			Treatment Acres										
1841	1	268	0	0	268	0	0	0	0	0	0	268	16
1841	2	18	0	0	18	0	0	0	0	0	0	18	16
1841	3	127	0	0	0	0	0	0	0	0	0	0	16
1841	4	529	0	0	529	0	0	0	0	0	0	529	16
1841	5	18	0	0	0	0	0	0	0	0	0	0	16
1841	6	37	37	0	0	0	37	0	0	37	37	0	16
1841	7	62	0	0	62	0	0	0	0	0	0	62	16
1841	8	26	0	0	26	0	0	0	0	0	0	26	16
1841	9	66	0	0	66	0	0	0	0	0	0	66	16
1841	10	141	0	0	141	0	0	0	0	0	0	141	16
1841	11	10	0	0	0	0	0	0	0	0	0	0	16
1841	12	37	0	0	37	0	0	0	0	0	0	37	16
1841	13	32	0	0	32	0	0	0	0	0	0	32	16
1841	14	15	0	0	15	0	0	0	0	0	0	15	16
1841	15	20	20	0	0	0	20	0	0	20	20	0	16
1841	16	21	21	0	0	0	21	0	0	21	21	0	16
1841	17	20	20	0	0	0	20	0	0	20	20	0	16
1841	18	20	20	0	0	0	20	0	0	20	20	0	16
1841	19	20	20	0	0	0	20	0	0	20	20	0	16
1841	20	47	0	0	0	0	0	0	0	0	0	0	16
1841	21	21	21	0	0	0	21	0	0	21	21	0	16
1841	22	20	20	0	0	0	20	0	0	20	20	0	16
1842	1	111	0	0	111	0	0	0	0	0	0	111	16
1842	2	37	0	0	0	0	0	0	0	0	0	0	16
1842	3	122	0	0	122	0	0	0	0	0	0	122	16
1842	4	130	0	0	0	0	0	0	0	0	0	0	16
1842	5	53	0	0	53	0	0	0	0	0	0	53	16
1842	6	109	0	0	109	0	0	0	0	0	0	109	16
1842	7	552	0	0	552	0	0	0	0	0	0	552	16
1842	8	111	0	0	111	0	0	0	0	0	0	111	16
1842	9	37	37	0	0	0	37	0	0	37	37	0	16
1842	10	72	0	0	72	0	0	0	0	0	0	72	16
1842	11	183	0	0	0	183	183	0	0	0	0	0	16
1842	12	26	0	0	26	0	0	0	0	0	0	26	16
1842	13	27	0	0	27	0	0	0	0	0	0	27	16
1842	14	208	0	0	208	0	0	0	0	0	0	208	16
1842	15	26	0	0	26	0	0	0	0	0	0	26	16
1842	16	27	0	0	27	0	0	0	0	0	0	27	16

NO HERBICIDE ALTERNATIVE													
Location			**Proposed Activity**										**Management Area**
Compartment	**Stand**	**Acres**	**Seedtree**	**Clearcut**	**Commercial Thinning**	**Group Selection**	**Site Preparation (mechanical)**	**Site Preparation (chemical)**	**Hand Plant**	**Pre-commercial Thinning**	**TSI Release**	**WSI Midstory Removal**	
			Treatment Acres										
1842	17	20	20	0	0	0	20	0	0	20	20	0	16
1842	18	20	20	0	0	0	20	0	0	20	20	0	16
1842	19	20	20	0	0	0	20	0	0	20	20	0	16
1842	20	20	20	0	0	0	20	0	0	20	20	0	16
1877	1	300	0	0	0	300	300	0	0	300	300	0	16
1877	2	751	0	0	751	0	0	0	0	0	0	751	16
1877	3	311	0	0	311	0	0	0	0	0	0	311	16
1877	4	413	0	0	413	0	0	0	0	0	0	413	16
1877	5	61	0	0	0	0	0	0	0	0	0	0	16
1877	6	103	0	0	103	0	0	0	0	0	0	103	16
1877	7	32	0	0	0	0	0	0	0	0	0	0	16
1877	8	122	0	0	122	0	0	0	0	0	0	122	16
1877	9	34	0	0	34	0	0	0	0	0	0	34	16
1877	10	12	0	0	12	0	0	0	0	0	0	12	16
1877	11	64	0	0	64	0	0	0	0	0	0	64	16
1877	12	43	0	0	43	0	0	0	0	0	0	43	16
1877	13	139	0	0	0	139	139	0	0	139	139	0	16
1877	14	17	0	0	0	0	0	0	0	0	0	0	16
1877	15	72	0	0	72	0	0	0	0	0	0	72	16
1877	16	13	0	0	0	0	0	0	0	0	0	0	16
1877	17	20	20	0	0	0	20	0	0	20	20	0	16
1877	18	56	0	56	0	0	56	0	56	0	0	0	16
1877	19	42	0	0	0	42	42	0	0	42	42	0	16
1877	20	20	20	0	0	0	20	0	0	20	20	0	16
1877	21	20	20	0	0	0	20	0	0	20	20	0	16
1877	22	21	21	0	0	0	21	0	0	21	21	0	16
1877	23	20	20	0	0	0	20	0	0	20	20	0	16
1877	24	20	20	0	0	0	20	0	0	20	20	0	16
1877	25	20	20	0	0	0	20	0	0	20	20	0	16
1877	26	20	20	0	0	0	20	0	0	20	20	0	16
1877	27	21	21	0	0	0	21	0	0	21	21	0	16
Total			481	56	4564	664	1201	0	56	1201	1201	4564	

UNEVEN-AGED ALTERNATIVE		
Location	**Proposed Activity**	

Compartment	Stand	Acres	Seedtree	Clearcut	Commercial Thinning	Group Selection	Site Preparation (mechanical)	Site Preparation (chemical)	Hand Plant	Pre-commercial Thinning	TSI Release	WSI Midstory Removal	Management Area
			Treatment Acres										
1841	1	268	0	0	268	0	0	0	0	0	0	268	16
1841	2	18	0	0	18	0	0	0	0	0	0	18	16
1841	3	127	0	0	0	0	0	0	0	0	0	0	16
1841	4	671	0	0	0	671	0	671	0	671	671	0	16
1841	5	18	0	0	0	0	0	0	0	0	0	0	16
1841	6	37	0	0	0	37	37	0	0	37	37	0	16
1841	7	62	0	0	62	0	0	0	0	0	0	62	16
1841	8	27	0	0	27	0	0	0	0	0	0	27	16
1841	9	67	0	0	67	0	0	0	0	0	0	67	16
1841	10	141	0	0	141	0	0	0	0	0	0	141	16
1841	11	10	0	0	0	0	0	0	0	0	0	0	16
1841	12	37	0	0	37	0	0	0	0	0	0	37	16
1841	13	32	0	0	32	0	0	0	0	0	0	32	16
1841	14	15	0	0	15	0	0	0	0	0	0	15	16
1841	20	47	0	0	0	0	0	0	0	0	0	0	16
1842	1	111	0	0	111	0	0	0	0	0	0	111	16
1842	2	37	0	0	0	0	0	0	0	0	0	0	16
1842	3	122	0	0	122	0	0	0	0	0	0	122	16
1842	4	130	0	0	0	0	0	0	0	0	0	0	16
1842	5	73	0	0	0	73	0	73	0	73	73	0	16
1842	6	109	0	0	109	0	0	0	0	0	0	109	16
1842	7	600	0	0	0	600	0	600	0	600	600	0	16
1842	8	152	0	0	0	152	0	152	0	152	152	0	16
1842	9	37	0	0	0	37	0	37	0	37	37	0	16
1842	10	72	0	0	72	0	0	0	0	0	0	72	16
1842	11	183	0	0	0	183	0	183	0	183	183	0	16
1842	12	26	0	0	0	26	0	26	0	26	26	0	16
1842	13	27	0	0	27	0	0	0	0	0	0	27	16
1842	14	208	0	0	208	0	0	0	0	0	0	208	16
1842	15	26	0	0	0	26	0	26	0	26	26	0	16
1877	1	300	0	0	0	300	0	300	0	300	300	0	16
1877	2	751	0	0	751	0	0	0	0	0	0	751	16
1877	3	311	0	0	311	0	0	0	0	0	0	311	16
1877	4	515	0	0	0	515	0	515	0	515	515	0	16
1877	5	61	0	0	0	0	0	0	0	0	0	0	16
1877	6	144	0	0	0	144	0	144	0	144	144	0	16
1877	7	32	0	0	0	0	0	0	0	0	0	0	16
1877	8	122	0	0	122	0	0	0	0	0	0	122	16
1877	9	34	0	0	34	0	0	0	0	0	0	34	16
1877	10	12	0	0	12	0	0	0	0	0	0	12	16
1877	11	64	0	0	64	0	0	0	0	0	0	64	16
1877	12	43	0	0	43	0	0	0	0	0	0	43	16
1877	13	139	0	0	0	139	0	139	0	139	139	0	16
1877	14	17	0	0	0	0	0	0	0	0	0	0	16

UNEVEN-AGED ALTERNATIVE													
Location			**Proposed Activity**										**Management Area**
Compartment	**Stand**	**Acres**	**Seedtree**	**Clearcut**	**Commercial Thinning**	**Group Selection**	**Site Preparation (mechanical)**	**Site Preparation (chemical)**	**Hand Plant**	**Pre-commercial Thinning**	**TSI Release**	**WSI Midstory Removal**	
			Treatment Acres										
1877	15	112	0	0	0	112	0	112	0	112	112	0	16
1877	16	13	0	0	413	0	0	0	0	0	0	413	16
1877	18	56	0	56	0	0	0	56	56	56	56	0	16
1877	19	42	0	0	0	42	0	42	0	42	42	0	16
Total			0	56	2654	3057	37	3113	56	3113	3113	2654	

Appendix B – Activities by Road Segment

The following tables list the specific actions proposed for each Forest road segment. All treatments are given in acres and miles. Acreage values are estimates based on best available data; actual treated area may be revised to reflect more accurate field information and stand analysis.

ACTIVITIES BY ROAD SEGMENT – ACTION ALTERNATIVES				
ID (Road #)	**Road Length (Miles)**	**Activities**		
		Fuel Break (Acres)	**Pollinator (Acres)**	**Road Description (Miles)**
50800	0.13	0.97	0.97	Existing Roads
50840	0.93	6.65	6.65	Existing Roads
50846	0.93	6.78	6.78	Existing Roads
50850	0.98	7.17	7.17	Existing Roads
50860	1.24	8.60	8.60	Existing Roads
50862	0.53	3.80	3.80	Existing Roads
50867	0.50	3.70	3.70	Existing Roads
50889	0.77	5.50	5.50	Existing Roads
50890	0.37	2.63	2.63	Existing Roads
52680	1.88	13.70	13.70	Existing Roads
52682	0.99	7.13	7.13	Existing Roads
52684	0.79	5.81	5.81	Existing Roads
52686	1.04	7.44	7.44	Existing Roads
52688	0.25	1.85	1.85	Existing Roads
52800	5.08	29.54	29.54	Existing Roads
52808	0.33	2.43	2.43	Existing Roads
52810	0.84	6.00	6.00	Existing Roads
52812	0.75	5.31	5.31	Existing Roads
52813	0.79	5.66	5.66	Existing Roads
52814	0.95	6.84	6.84	Existing Roads
52815	0.35	2.57	2.57	Existing Roads
52816	0.46	3.43	3.43	Existing Roads
52818	0.23	1.64	1.64	Existing Roads
Mako Road	0.35	2.50	2.50	Existing Roads
OK259A	2.52	12.00	12.00	Existing Roads
NR-1	0.58	4.29	4.29	New/Relocated Roads
NR-2	0.16	1.24	1.24	New/Relocated Roads
NR-3	0.48	3.50	3.50	New/Relocated Roads
NR-4	0.82	6.04	6.04	New/Relocated Roads
NR-5	0.82	5.94	5.94	New/Relocated Roads
NR-6	0.29	2.18	2.18	New/Relocated Roads
NR-7	1.26	9.14	9.14	New/Relocated Roads
NR-8	0.13	0.87	0.87	New/Relocated Roads
RC-1	0.48	3.07	3.07	New/Relocated Roads
TOTAL	**28.99**	**195.92**	**195.92**	

Appendix C - Project Maps

1. **Management Areas**
2.
    a. **Proposed Timber Harvest – Proposed Action**
    b. **Proposed Timber Harvest – Uneven Aged**
3.
    a. **Proposed Silvicultural Activities – Proposed Action**
    b. **Proposed Silvicultural Activities – No Herbicide**
    c. **Proposed Silvicultural Activities – Uneven Aged**
4.
    a. **Proposed Wildlife Activities – Proposed Action**
    b. **Proposed Wildlife Activities – No Herbicide**
    c. **Proposed Wildlife Activities – Uneven Aged**
5. **Proposed Fuels Treatments and Fire Line Activities**
6. **Proposed Transportation Activities**
7. **Soil Concerns**
8. **Water Resources**
9. **Scenic Integrity Objectives**
10. **Stands and Compartments**
11. **Conservation Lands**

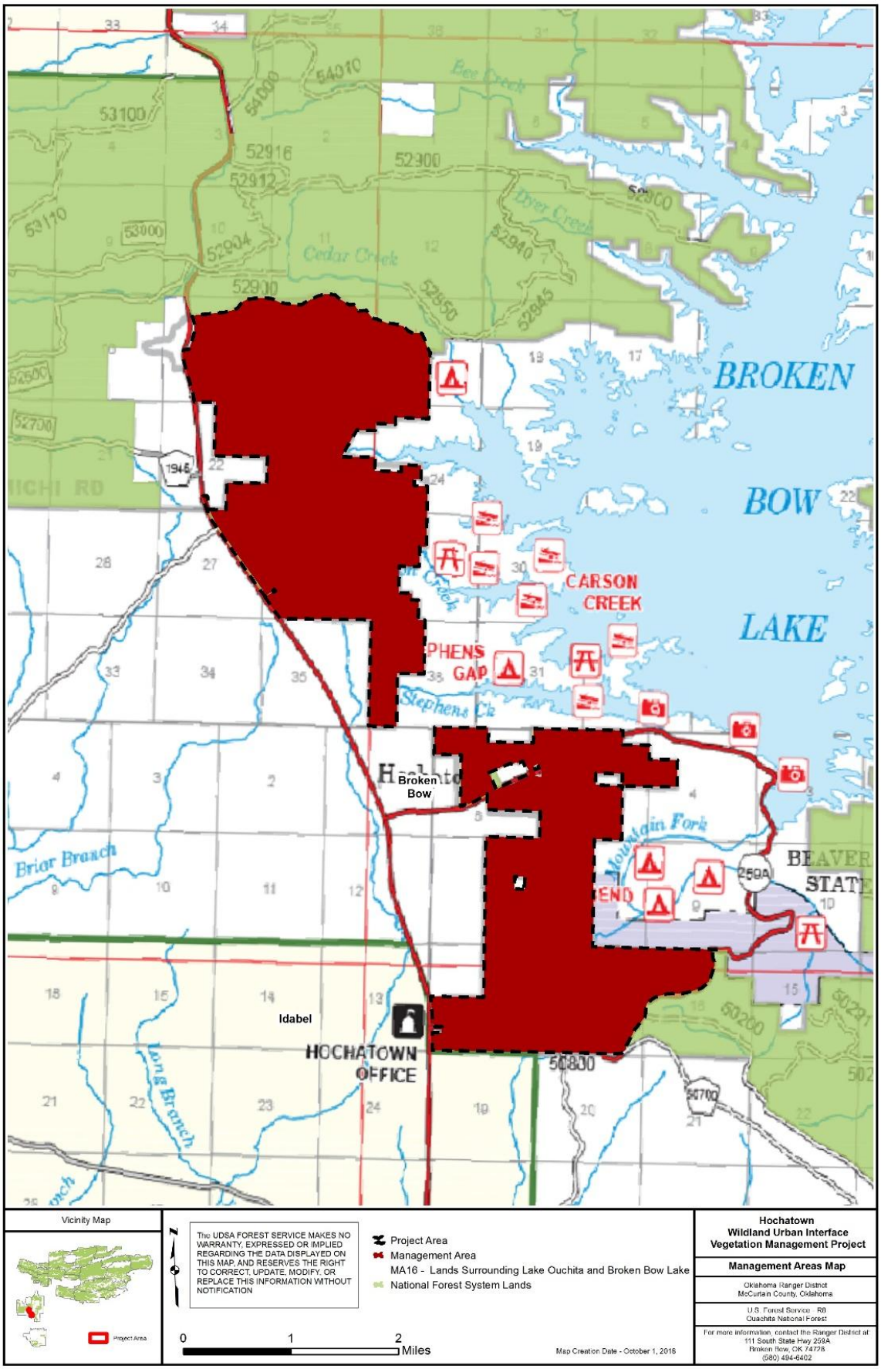

FIGURE 1A. MANAGEMENT AREA MAP

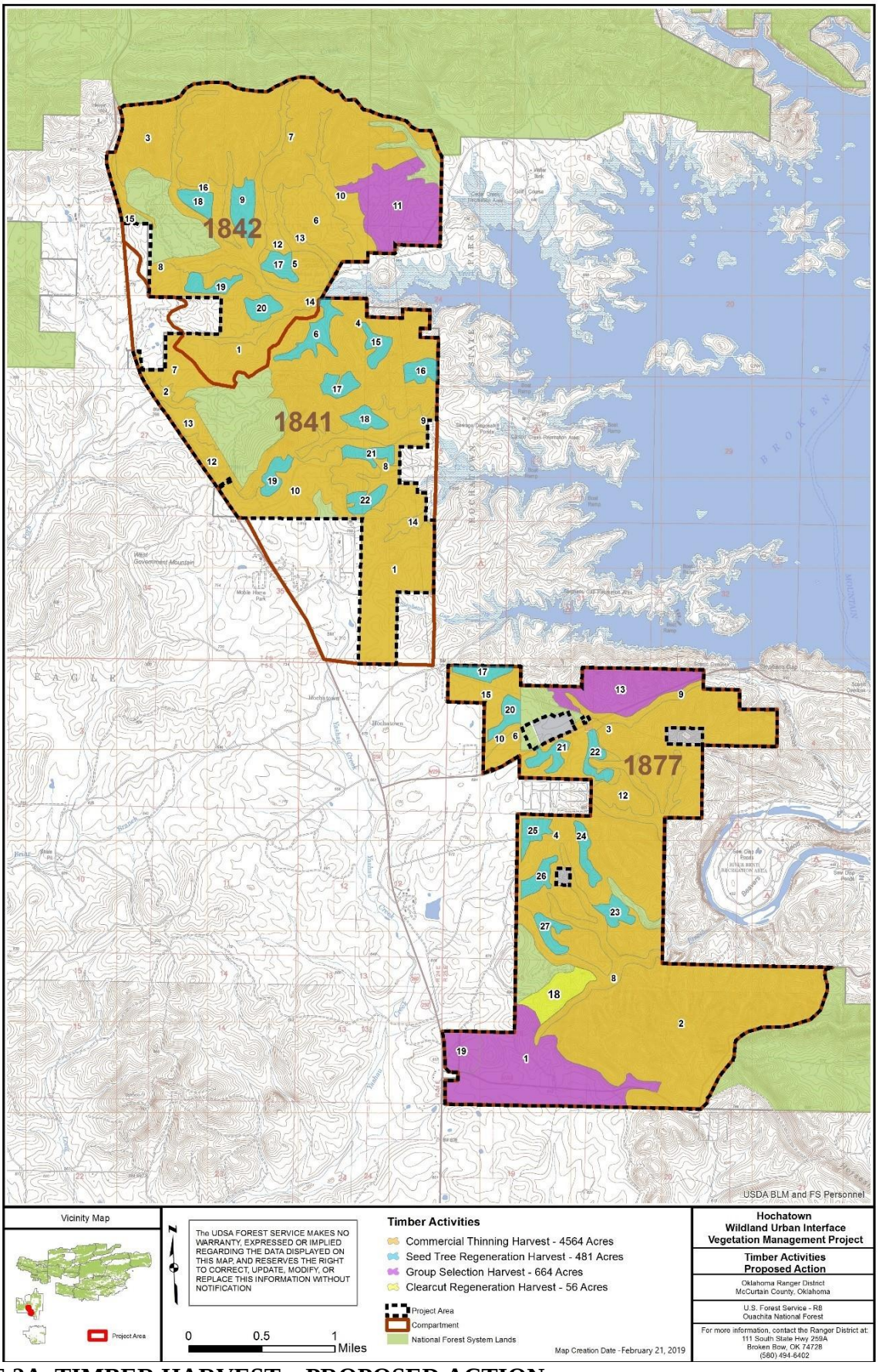

FIGURE 2A. TIMBER HARVEST – PROPOSED ACTION

Ouachita National Forest
Arkansas and Oklahoma

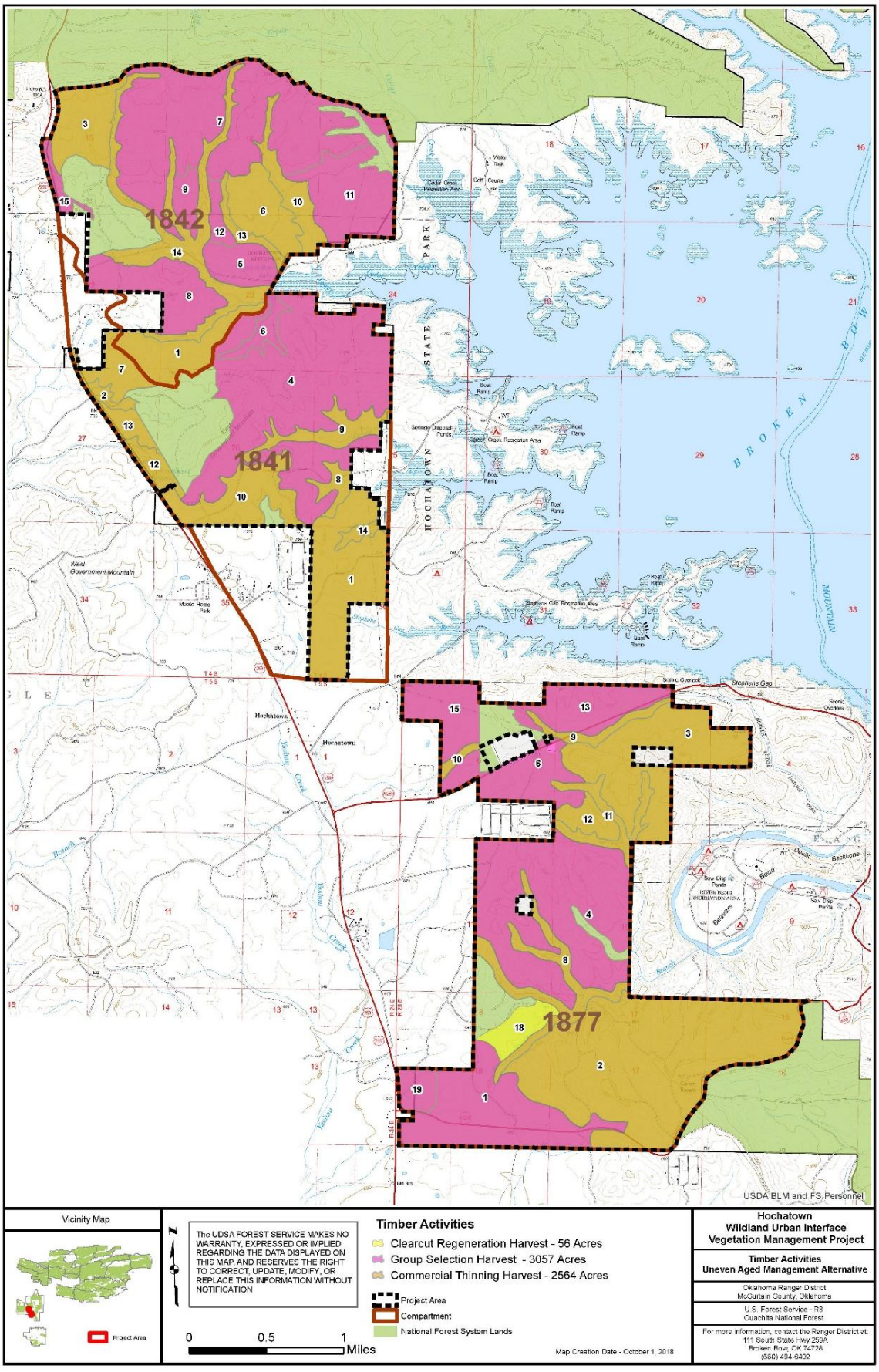

FIGURE 2B. TIMBER HARVEST – UNEVEN AGED MGT ALTERNATIVE

Ouachita National Forest
Arkansas and Oklahoma

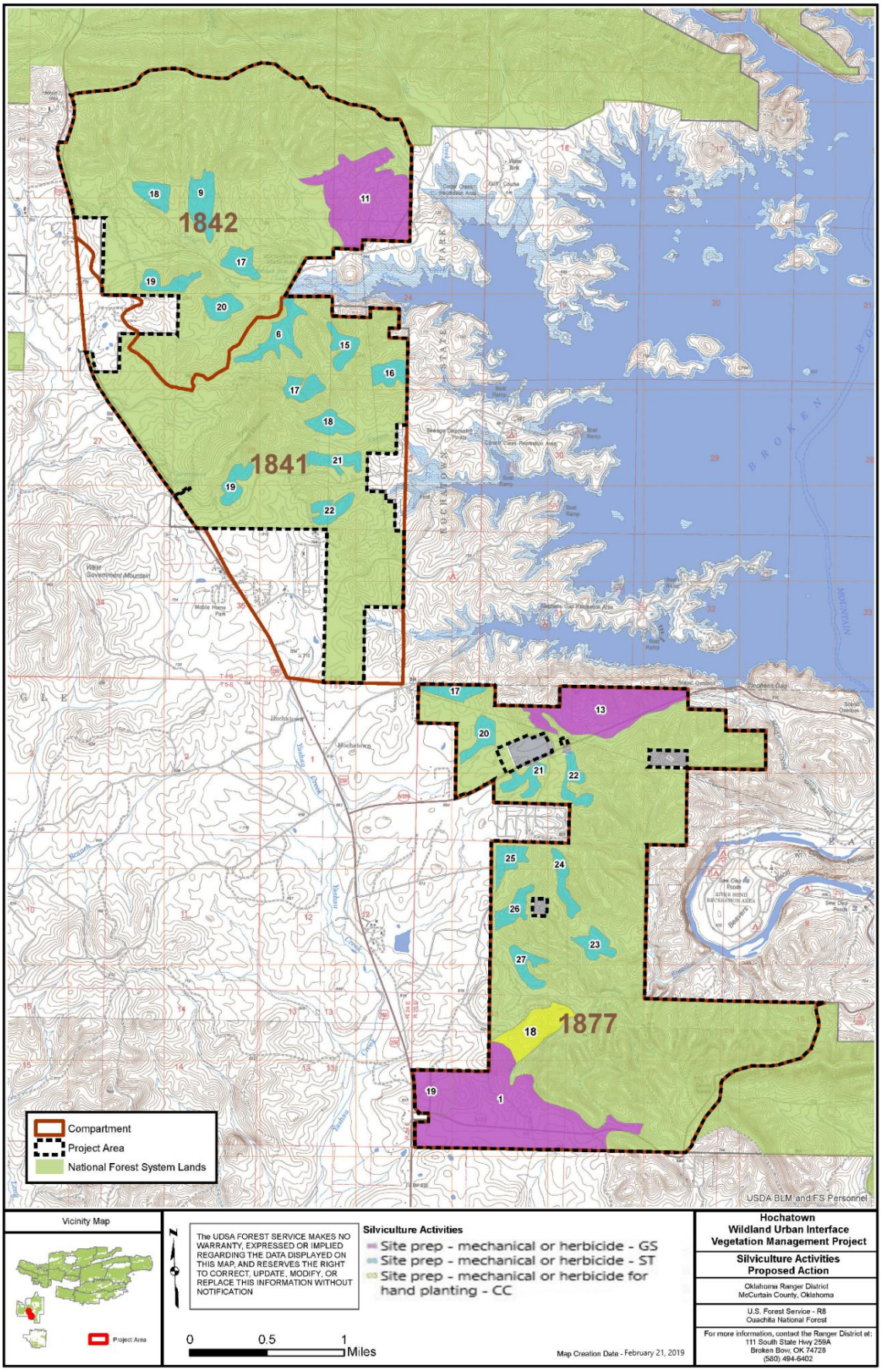

FIGURE 3A. SILVICULTURAL ACTIVITIES –PROPOSED ACTION

Ouachita National Forest
Arkansas and Oklahoma

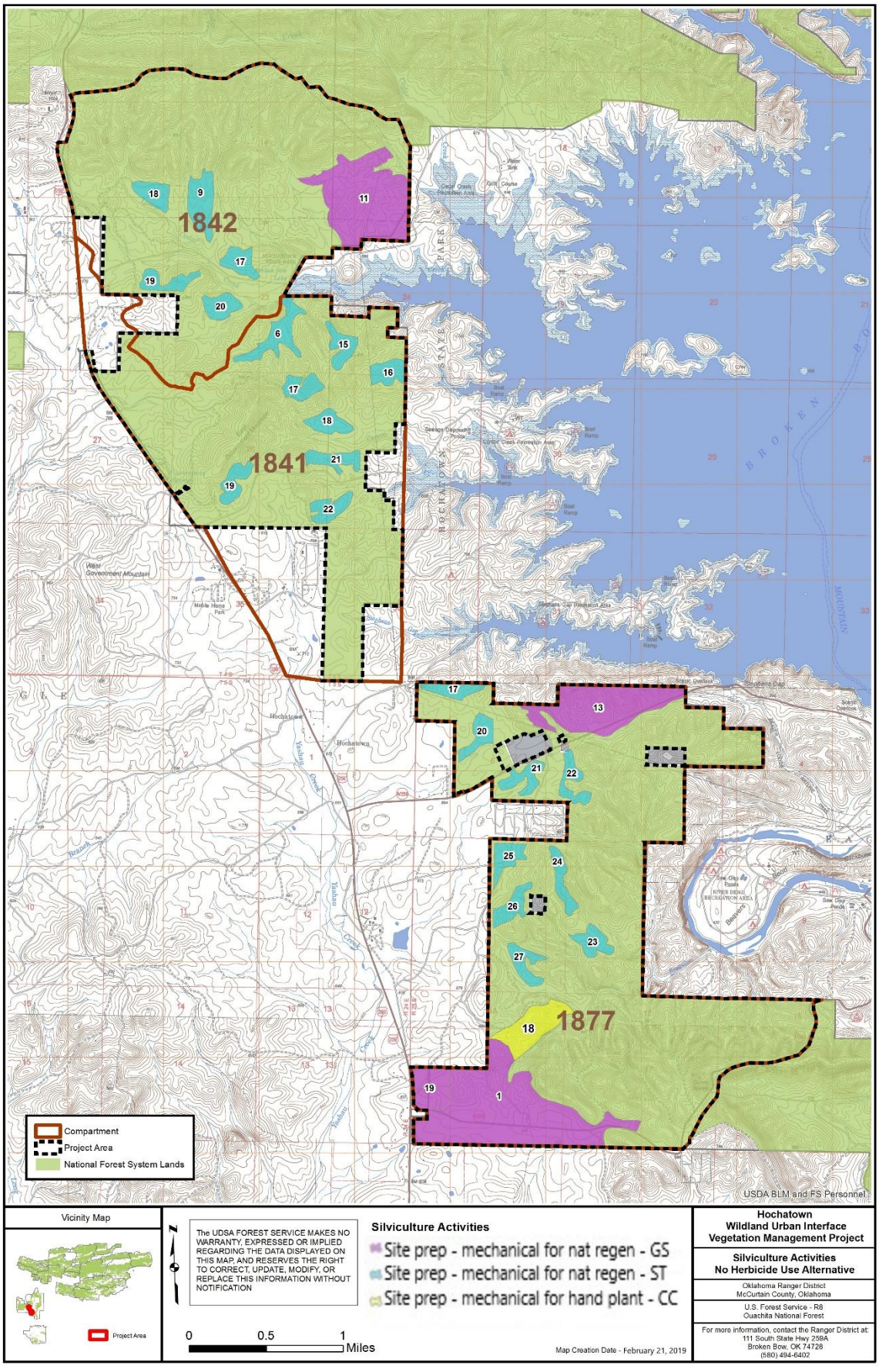

FIGURE 3B. SILVICULTURAL ACTIVITIES –NO HERBICIDE ALTERNATIVE

Ouachita National Forest
Arkansas and Oklahoma

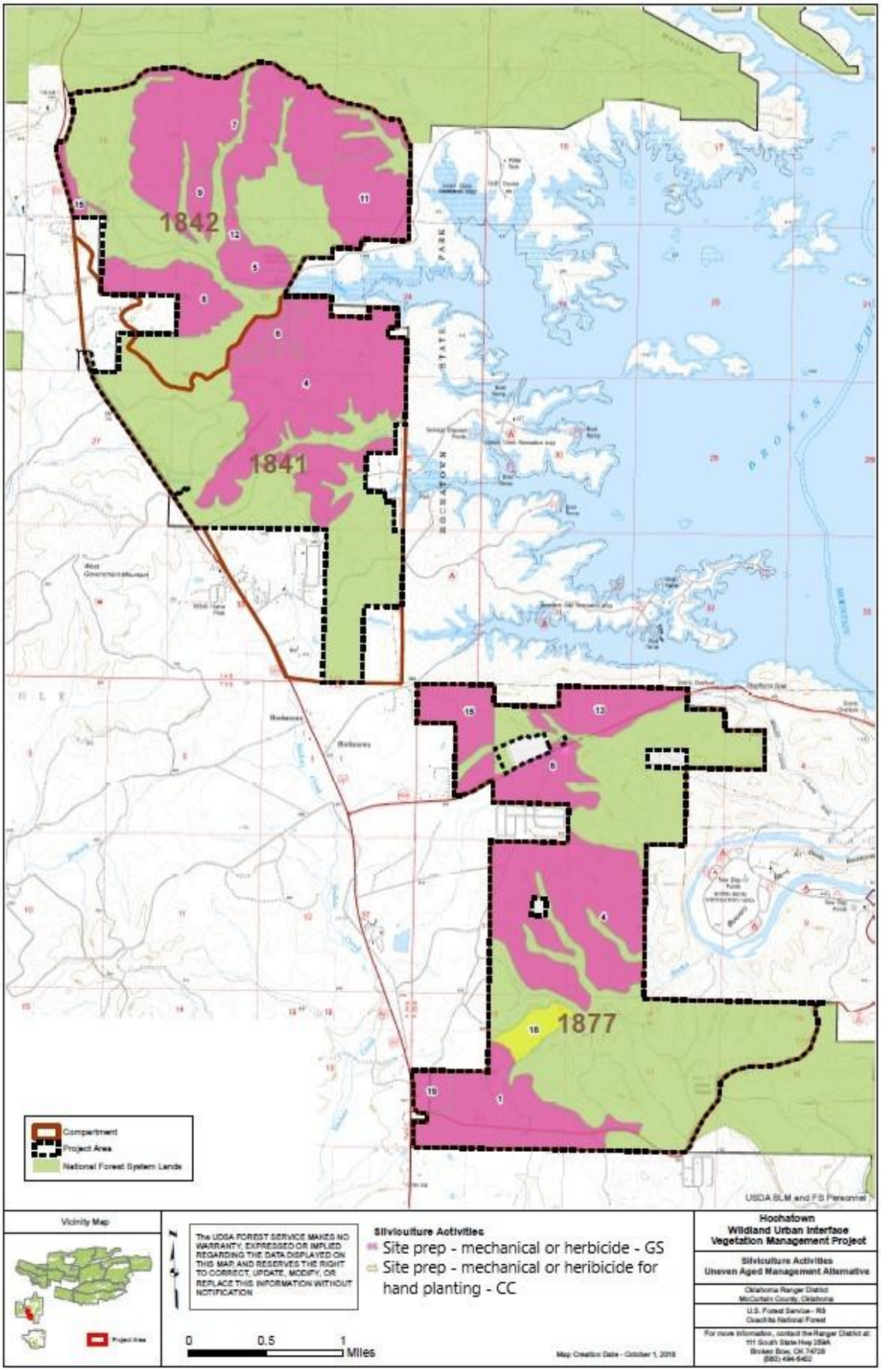

FIGURE 3C. SILVICULTURAL ACTIVITIES –UNEVEN AGED MGT ALTERNATIVE

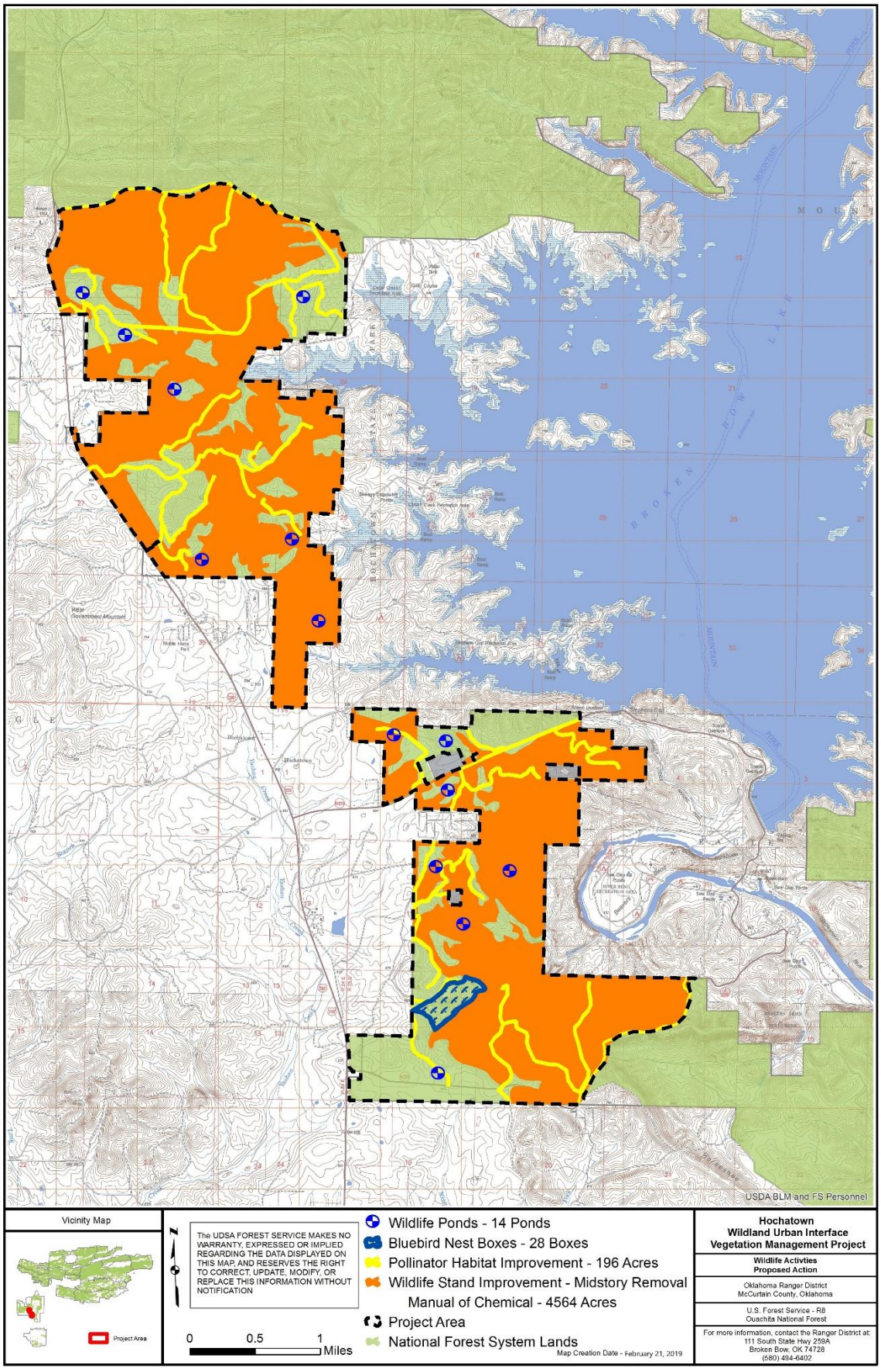

FIGURE 4A. WILDLIFE ACTIVITIES – PROPOSED ACTION

Ouachita National Forest
Arkansas and Oklahoma

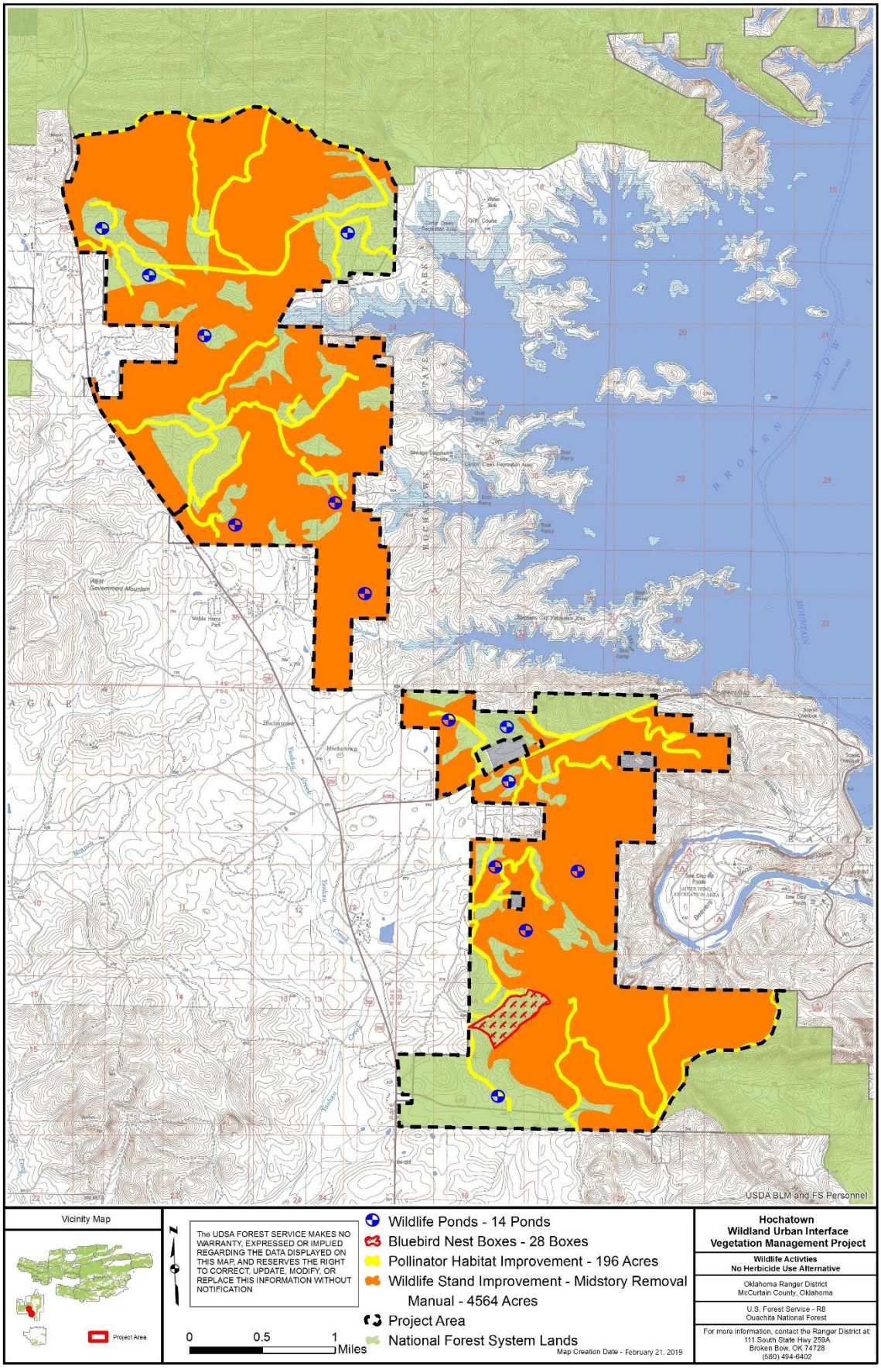

FIGURE 4B. WILDLIFE ACTIVITIES – NO HERBICIDE ALTERNATIVE

Ouachita National Forest
Arkansas and Oklahoma

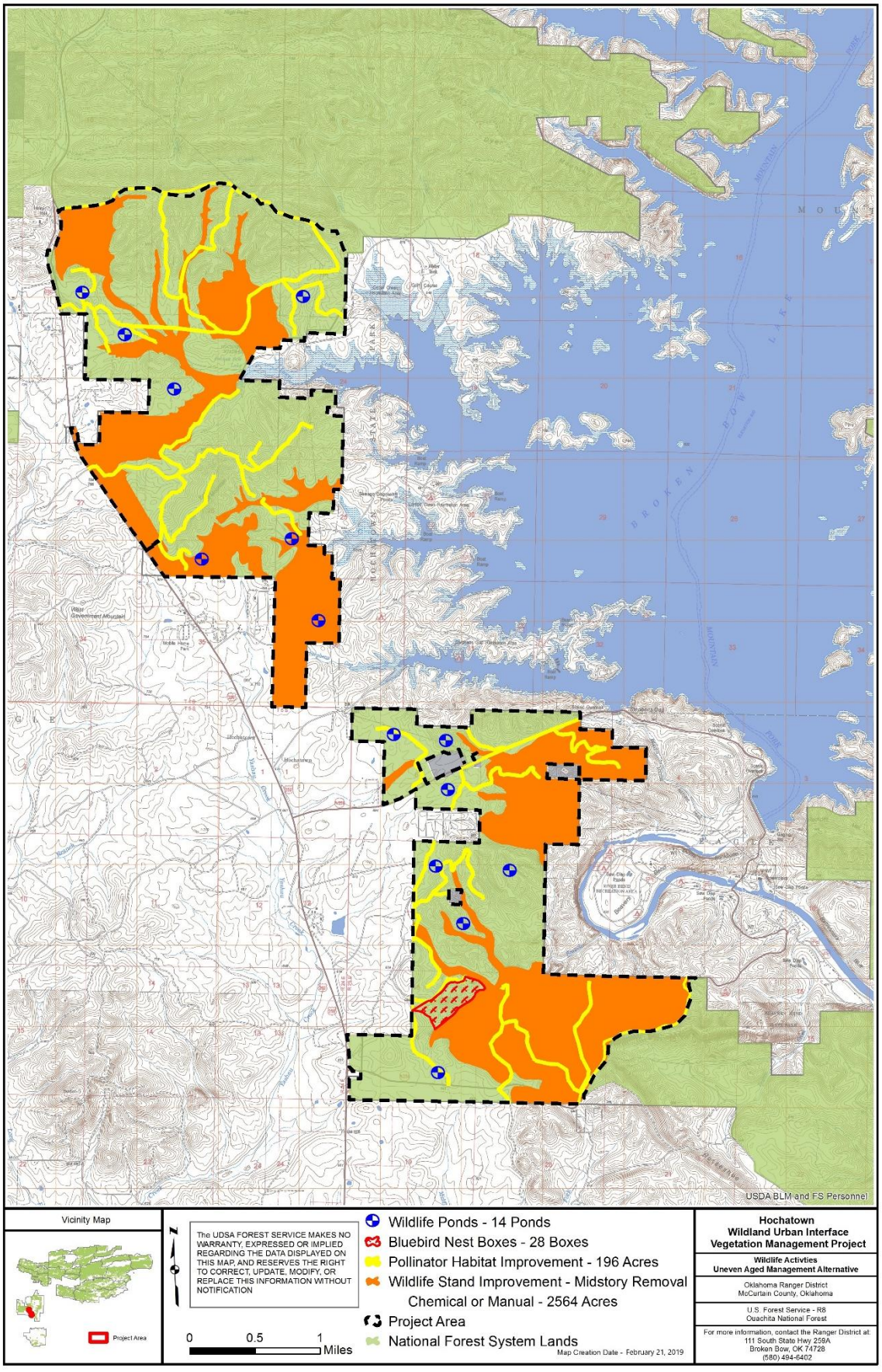

FIGURE 4C. WILDLIFE ACTIVITIES – UNEVEN AGED MGT ALTERNATIVE

Ouachita National Forest
Arkansas and Oklahoma

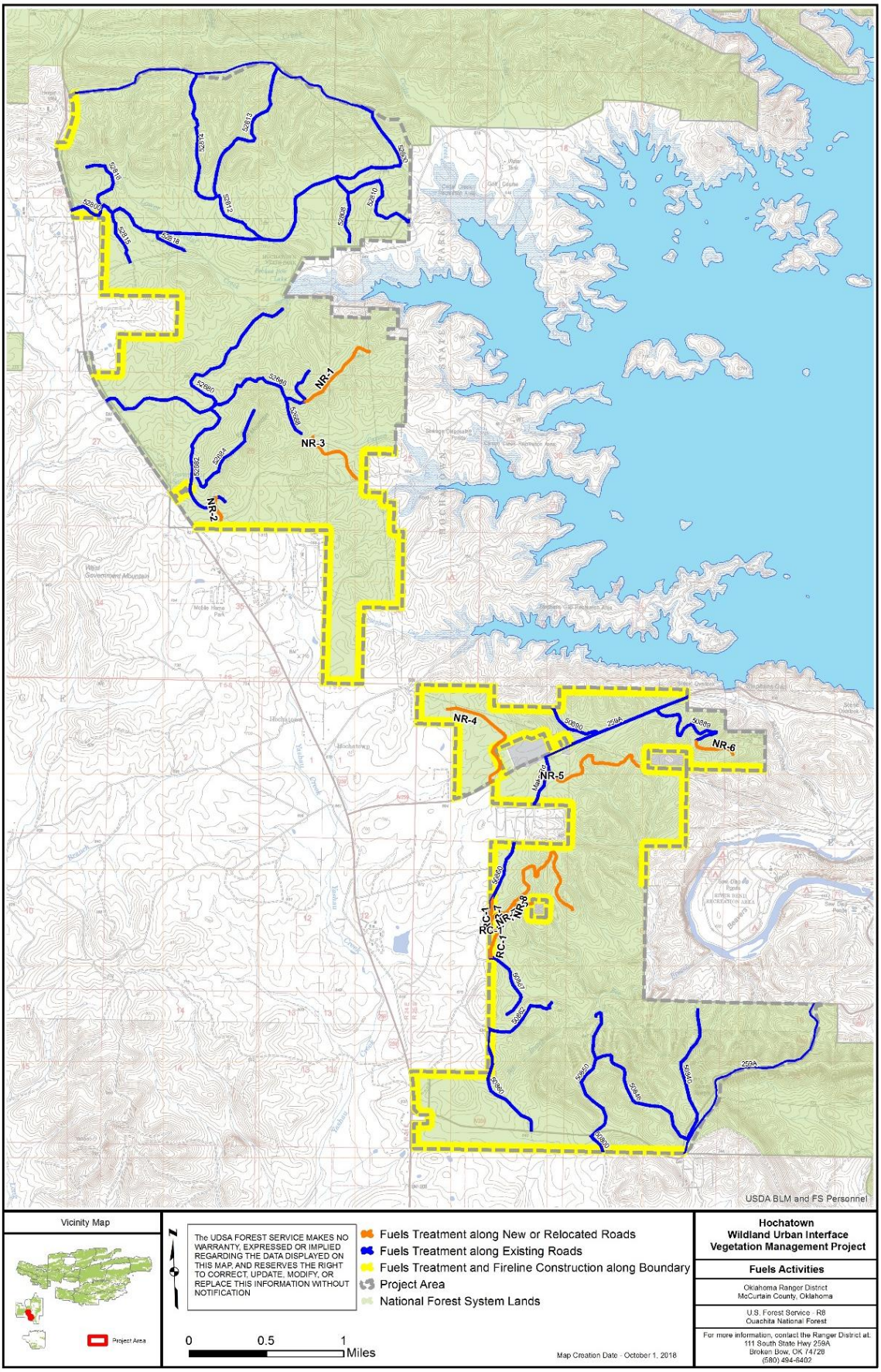

FIGURE 5. FUELS TREATMENTS AND FIRE LINES – ALL ACTION ALTERNATIVES

Ouachita National Forest
Arkansas and Oklahoma

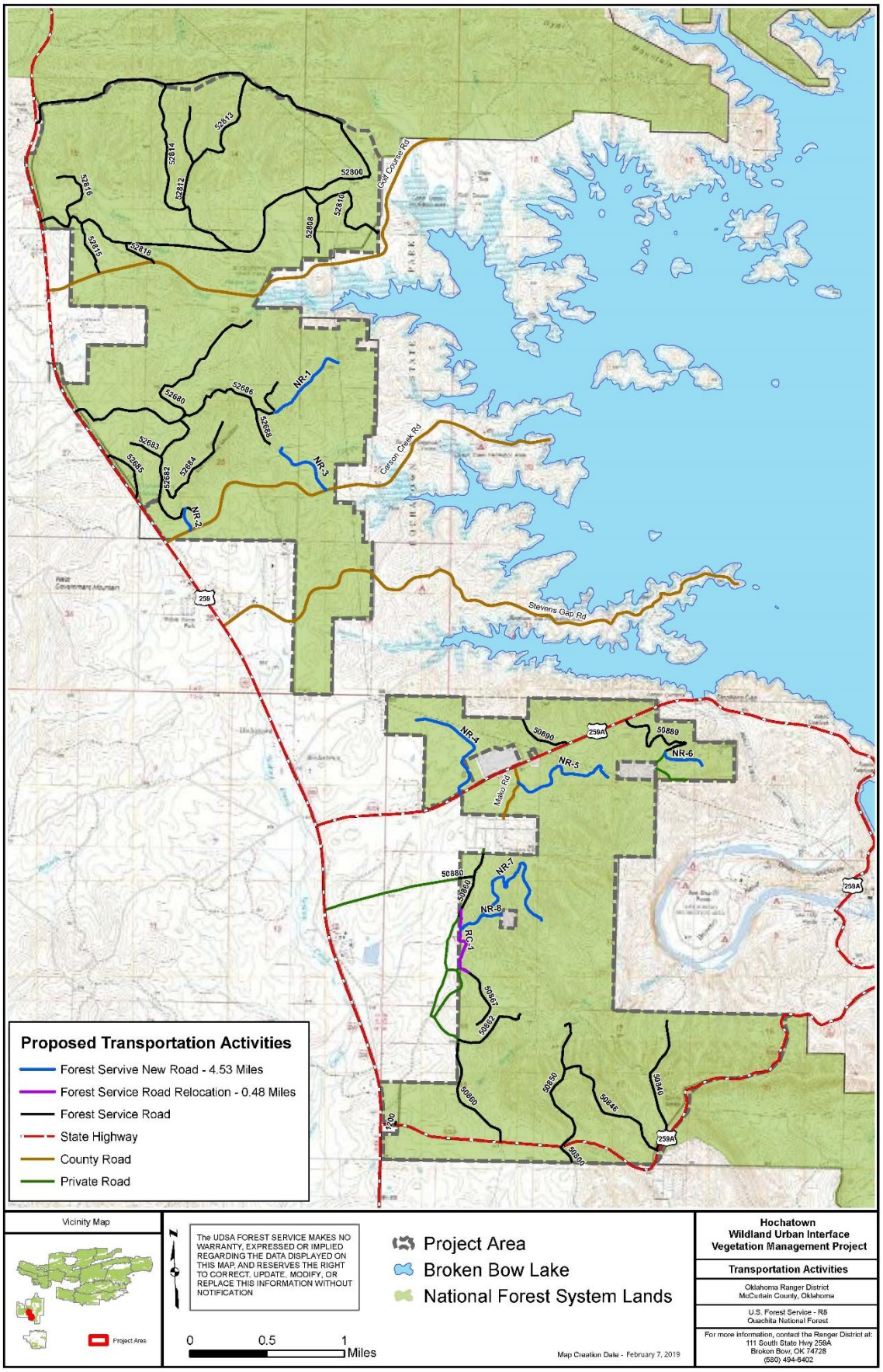

FIGURE 6. TRANSPORTATION ACTIVITIES – ALL ACTION ALTERNATIVES

Ouachita National Forest
Arkansas and Oklahoma

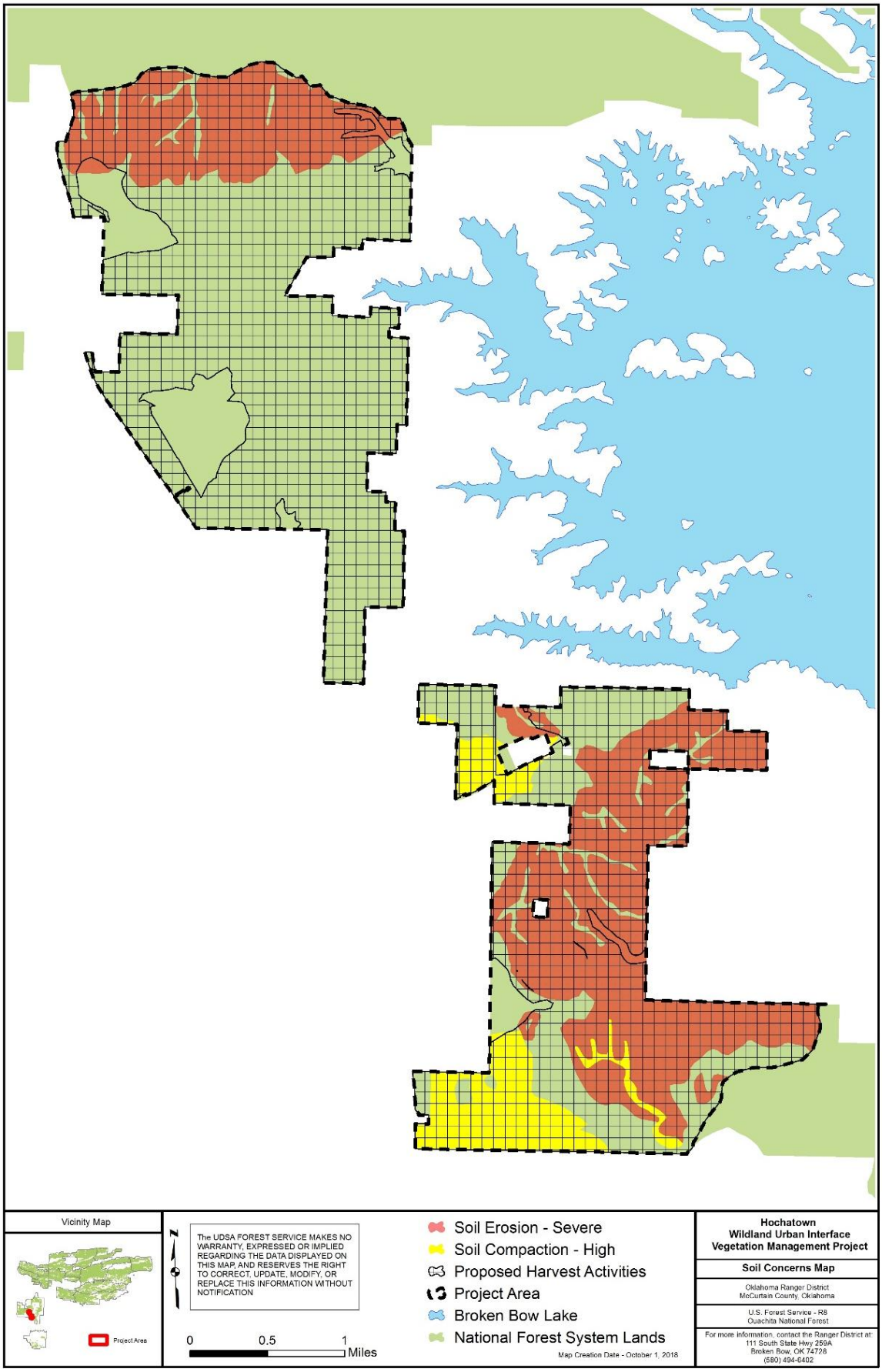

FIGURE 7. SOIL CONCERNS MAP

Ouachita National Forest
Arkansas and Oklahoma

FIGURE 8. WATER RESOURCES MAP

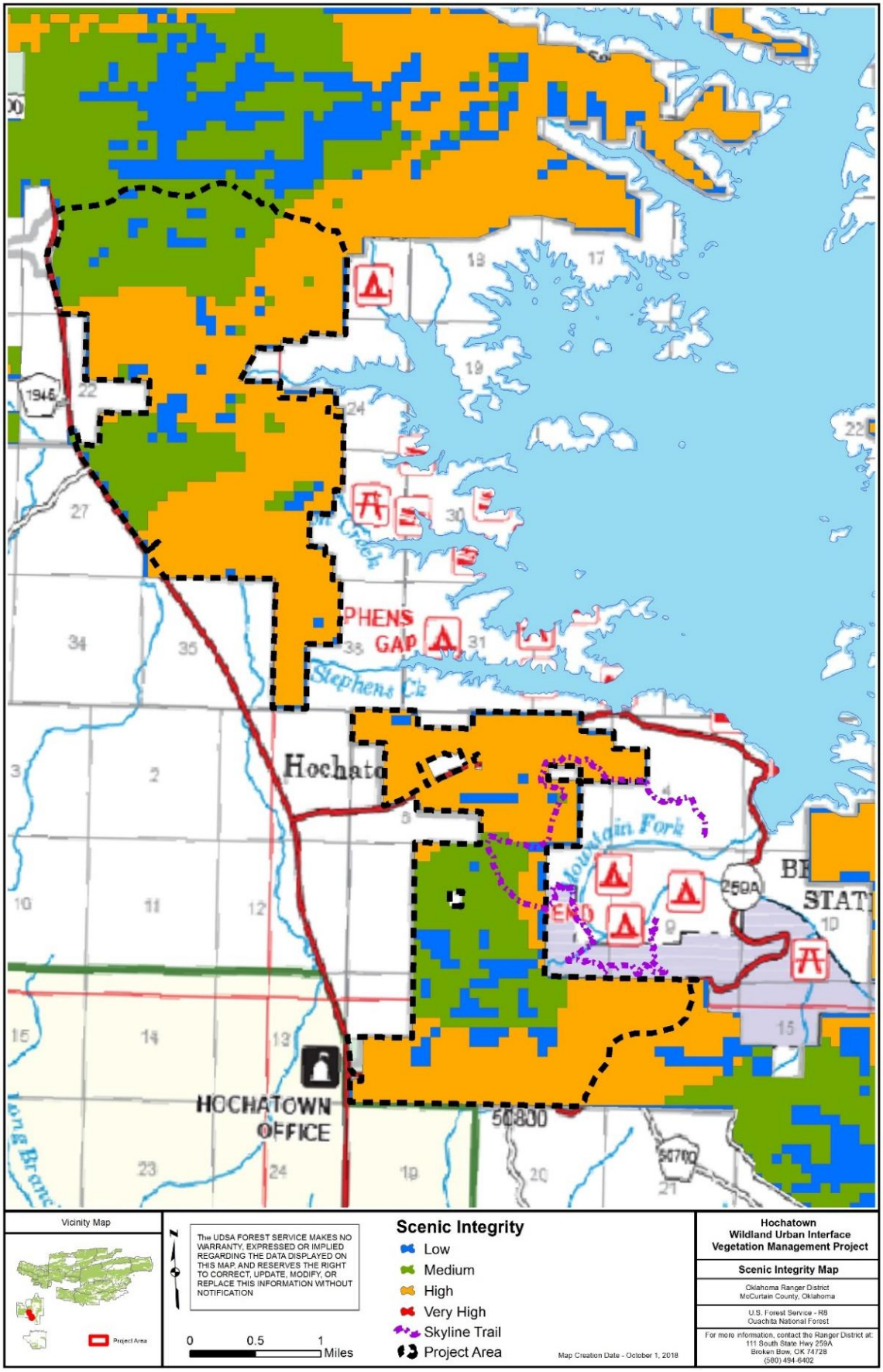

FIGURE 9. SCENIC INTEGRITY OBJECTIVES MAP

Ouachita National Forest
Arkansas and Oklahoma

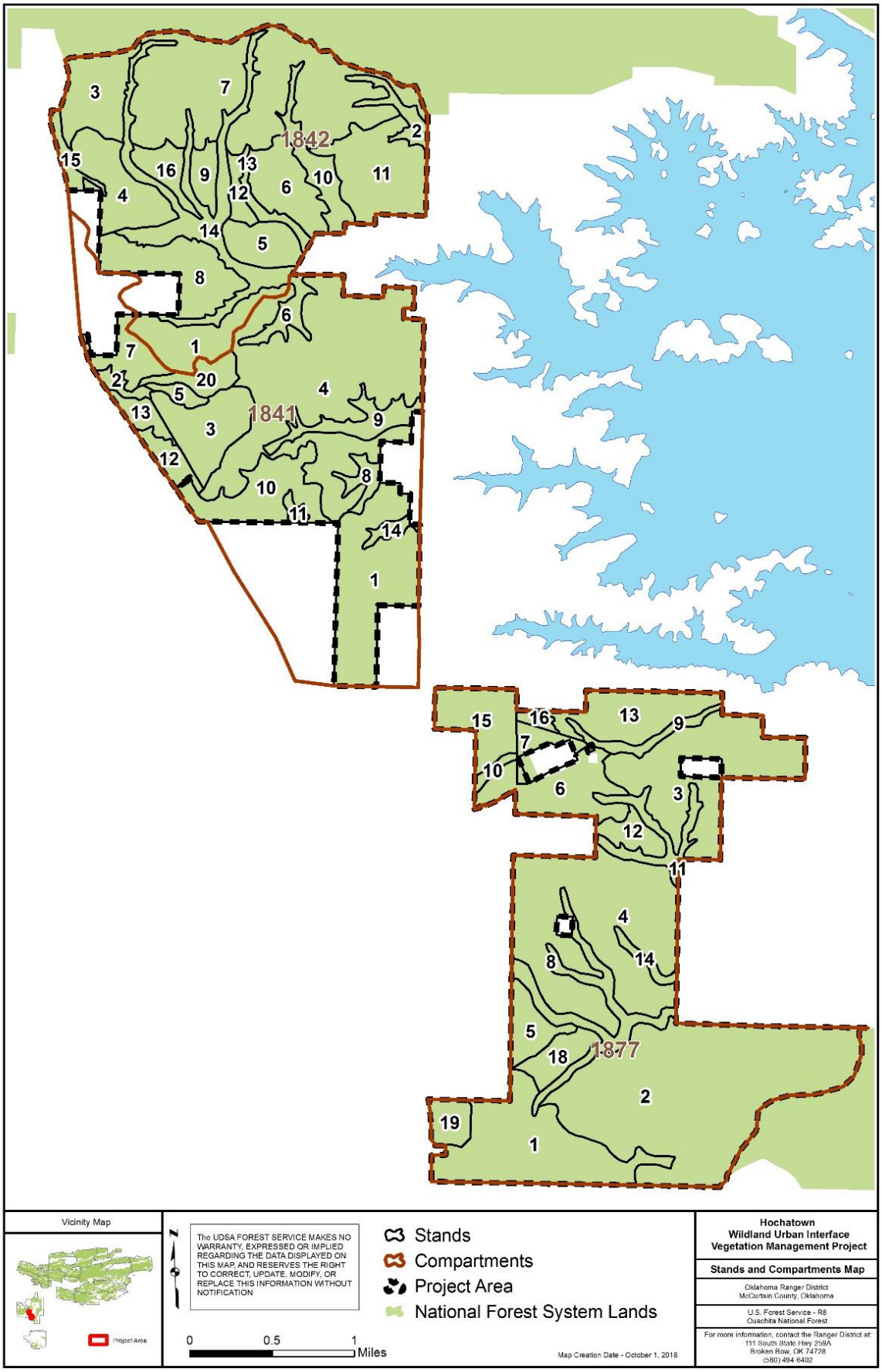

FIGURE 10. COMPARTMENTS AND STANDS MAP

Ouachita National Forest
Arkansas and Oklahoma

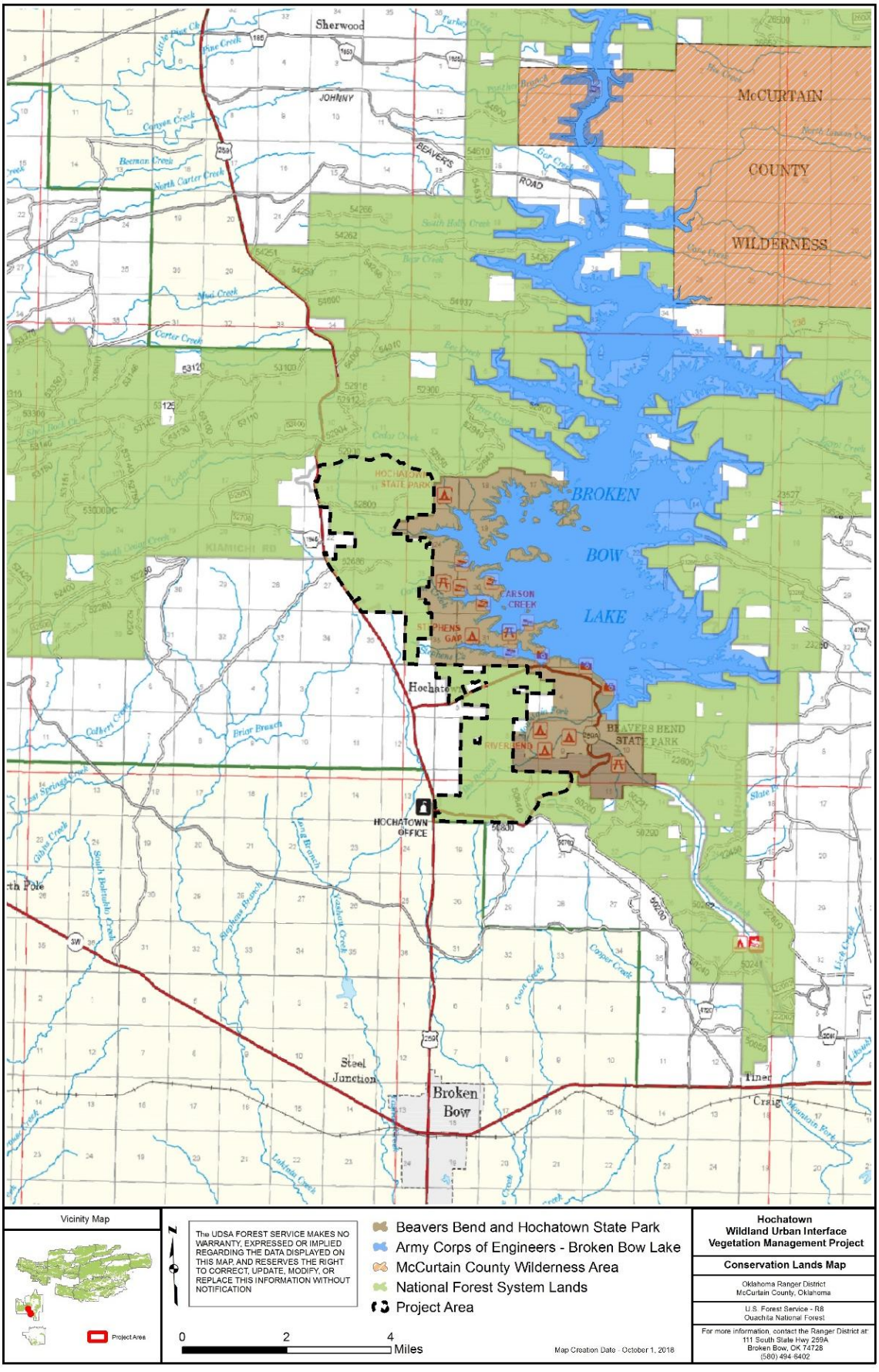

FIGURE 11. CONSERVATION LANDS MAP

Ouachita National Forest
Arkansas and Oklahoma